Regency® COMMUNICATIONS, INC.

SERVICE MANUAL

UHF RACK MOUNTED FM TRANSCEIVER

MODELS MCCU01A, B MCCU04A, B

1227 S. PATRICK DR.
SATELLITE BEACH, FL

0300-4224-800

PRINTED IN USA
7-81

MCCU01 AND U04 SERIES SERVICE MANUAL

SECTION 1 GENERAL INFORMATION

1-1 Description
1-2 Specifications
1-3 Installation
1-4 Operation
1-5 Crystal Specifications
1-6 Crystal Installation

SECTION 2 RECEIVER CIRCUIT DESCRIPTIONS

2-1 Receiver RF Front End, Oscillator and 1st Mixer
2-2 IF Audio Circuit
2-3 Receiver Block Diagram

SECTION 3 TRANSMITTER CIRCUIT DESCRIPTIONS

3-1 Audio Section
3-2 Crystal Oscillator
3-3 Frequency Multiplier System
3-4 VSWR System
3-5 Transmitter Block Diagram

SECTION 4 ALIGNMENT AND TUNING PROCEDURES

4-1 Transmitter and Receiver Alignment - TP-14-351

SECTION 5 DIAGRAMS, VOLTAGE DATA AND SCHEMATICS

5-1 Main Board Parts Placement/Silkscreen (Dwg. #704-062)
5-2 Main Board Parts Overlay Diagram (DWG.#704-066)
5-3 Main Board Schematic Diagram (DWG.#704-131)
5-4 Main Board Jumper Diagram (DWG.#704-067)
5-5 Receiver Voltage Data
5-6 Transmitter Voltage Data
5-7 Main Chassis Schematic (DWG.#504-508)
5-8 LED Board

SECTION 6 PARTS LIST

6-1 Receiver Board
6-2 Transmitter Board
6-3 Variable Parts for Range B (470-512 MHz)
6-4 ON/OFF Indicator Board (DWG.#501-176)
6-5 Chassis Assembly

SECTION 1 - GENERAL INFORMATION

1-1 DESCRIPTION

The Regency MCCU01, U04 series radios are rack-mounted FM transceivers designed for operating in the UHF (450-512 MHz) communications band. The MCCU01 and MCCU04 models are one and four-channel units, respectively. Both models are completely solid state.

The transmitter and receiver sections can be pre-tuned to any frequency within the specified segment of the two bands (450-470, 470-512 MHz). The two sections are independently tuned, thus either one can be tuned to a different frequency (within the proper segment) than the other. However, the maximum frequency spread for the transmitter section is ±1.5 MHz, while the receiver frequency spread is ±.75 MHz from a center tune-up frequency. In other words, the maximum difference between the lowest and highest frequency is 3 MHz for transmit frequencies and 1.5 MHz for receive frequencies when center tune-up frequency is used. A special tune-up procedure may be used to tune the transmitter for ± 3 MHz from center frequency or a total of 6 MHz separation when a center tune-up crystal is used.

The receiver section is a double-conversion, super-heterodyne type receiver. Silicon transistors are utilized for dependability under widely varying ambient conditions. Also, Integrated Circuits are used, providing for compactness and circuit reliability. A crystal first IF filter and a ceramic second IF filter are employed for optimum performance where numerous channels are active within the same area of the country.

The transmitter section also utilizes silicon transistors throughout and is capable of continuous duty operation.

The transmitter employs direct F.M. for the ultimate in modulation capability. Internal controls are provided for setting the amount of deviation. The deviation control is adjusted for a maximum of ±5 KHz deviation, in conformance with FCC regulations.

The attenuation of spurious emissions from the transmitter, RF power output, frequency stability, performance under varying conditions of temperature and voltage, and other specifications, all exceed the limits required for Type Acceptance by the Federal Communications Commission.

NOTE: The Regency Type MCCU01 and U04 are certified under Part 15 and type accepted under Parts 21, 90, and 95 (A Range only) of the F.C.C. Rules and Regulations.

1-2 SPECIFICATIONS

Transceiver Specifications	304-248
Sensitivity Performance	304-116
Self Quieting Spurious	304-122

1-3 INSTALLATION

The MCCU01, U04 is supplied for mounting in standard relay racks. Slide brackets may be attached to the transceiver chassis to permit easy access to the technician adjustments without removing completely from the rack cabinet.

The microphone hang-up clip must be mounted so it is electrically grounded to the metal case of the cabinet. Mount it in a convenient location, accessible to the technicians, or the local operator (if any).

Connections for an external (or remotely mounted) speaker are provided. These terminals are connected to the audio output and may be used as a convenient test point. In permanent installations, the internal speaker should be disconnected. The use of a 3 to 4 ohm external speaker (Regency MA-108) is recommended.

1-4 OPERATION

The OFF-ON Switch is an integral part of the VOLUME control. Turning this control fully counter-clockwise until a click is heard will turn the unit off. Maximum volume or audio output, occurs when the volume control is turned fully clockwise.

The receiver's audio is squelched off when the SQUELCH control is turned COUNTER-CLOCKWISE. Turning this control counter-clockwise until the noise just disappears (threshold squelch) permits the receiver to be "quiet" until an actual signal is received. With the squelch control set fully counter-clockwise, the receiver will still operate properly and will not be locked-out (prevented from responding to a received signal).

The MCCU04 is capable of operating on any one of four frequencies. The desired channel is selected by turning the Channel Selector to the position corresponding to the desired channel F1, F2, F3, or F4.

A high impedance ceramic microphone is supplied with the unit. To install the microphone on the unit, insert the connector plug into its socket with the locating tab toward the bottom of the radio. The connector is then locked into place by rotating the locking ring 1/4 turn clockwise.

To transmit a message, it is only necessary to press the push-to-talk button on the microphone and speak into the microphone. The Transmit Indicator will come on to signify that the transmitter is activated. Best results are obtained by holding the microphone about one inch from the lips and inclined at about a 30 degree angle away from the face. Speak clearly in a normal tone of voice across the face of the microphone.

1-5 CRYSTAL SPECIFICATIONS

Miniature plug-in crystals are utilized by both the receiver and transmitter sections. Because of the high accuracy (close tolerance) required, Regency crystals are recommended. Either receive or transmit crystals must be ordered by specifying the Channel Frequency and Part No. 2329-0XXX-XXX for Receive or Part No. 2328-0XXX-XXX for Transmit. Use of other manufacturers' transmit crystals may cause violation of the FCC Rules and Regulations.

If desired, the RECEIVE and TRANSMIT crystals may be purchased from other manufacturers. The following specifications must be included in the order. (See following drawings - 302-540 (Receive), 302-539 (Transmit).)

1-6 CRYSTAL INSTALLATION

Prior to installing a crystal, the transceiver's top cover will have to be removed.

See Figure 1-1 for proper Crystal Installation. Insert the Receive crystal in the proper channel; be sure the crystal is firmly seated in the socket pins.

Special care must be taken to install the crystals correctly. The conduction type crystal heater, which is used to heat the crystals at a very low ambient temperature, relies on having proper physical contact between the heater element and the crystal for effective operation. The Crystal Heater Detail (Figure 1-1 demonstrates the correct method of crystal installation. The crystal must be pressed down into the socket pins far enough for the rim around the bottom of the crystal to clear the heating element and allow good contact between the side of the crystal and the element.

Refer to Section 4 for receiver and transmitter crystal netting procedures.

No	GENERAL	NOMINAL	GUAR
1	CHANNELS	1	———
2	FREQ RANGE	450-515 MHz 2 BAND	———
3	OPERATING TEMP	-30° C TO +60° C	———
4	OPERATING DUTY CYCLE	CONTINUOUS DUTY	———
5	SIZE (W-D-H)	19" x 9.5" x 3" RACK MOUNTED	———
6	WEIGHT	5 LBS, 9 OZ.	———
7	POWER	@ 13.6 VDC	———
	CURRENT DRAIN	13.6 VDC	———
8	RCVR SQUELCH	400 MA *	———
9	RCVR MAX. AUDIO	850 MA *	———
10	TRANSMIT	1050 MA	———
11	ANTENNA	50 Ω	———
12	CHANNEL SPACING	25 KHz	———

No	RECEIVER	NOMINAL	GUAR
	SENSITIVITY	———	———
13	20 DB Q	.4 µV	.5 µV (MAX)
14	12 DB SINAD	.3 µV	.35 µV (MAX)
	AUDIO SQ SENSITIVITY	———	———
15	THRESHOLD	.2 µV	.25 µV (MAX)
16	TIGHT	.55 µV	.7 µV (MAX)
17	CTCSS	———	.2 µV (MAX)
18	ADJ.CH SEL 20DB	-120 dB	-100 dB (MIN)
19	ADJ. CH. DESEN 12DB	-83 dB	-80 dB (MIN)
20	OPERATING BANDWIDTH	± 750 KHz FM. CTR	SEE 304-116
21	SPURIOUS & IMAGE	-85 dB	-80 dB (MIN)
22	IM 20 DB Q	———	-75 dB (MIN)
23	IM 12 DB SINAD	———	-75 dB (MIN)
24	MAB	± 6.5 MHz.	± 7.5 MHz (MAX)
25	FREQ STAB TEMP.	———	±.00025% (MAX)
26	FREQ STAB VOLTAGE	———	±.0001% (MAX)
27	AUDIO RESPONSE	———	EIA+2/-8:6 dB OUT DE-EMPHASIS
28	AUDIO OUT PWR (MAX)	———	4 W @ 5% DISTORTION

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	RELEASE 382 DCD 8-19-80	8/21/80	DLF

NO	RECEIVER	NOMINAL	GUAR
29	AUDIO OUT PWR (MAX)		5 W @ 10 % DISTORTION
30	SQ BLOCKING		3 KHz DEV. 300-3 KHz NONE EIA
31	RCVR ATTACK TIME		100 MS (MAX)
32	RCVR SQ CLOSING	———	150 MS (MAX)
33	HUM & NOISE RATIO	50 dB /60 dB (UNSQ / SQ)	45 dB / 55 dB (UNSQ / SQ)
34	UNDESIRED CONDUCTED (AC)	———	———
35	UNDESIRED CONDUCTED (RF)	———	———
36	UNDESIRED RADIATED	———	FCC
37	HIGH HUMIDITY	———	———
38	VIBRATION STAB	———	———
39	SHOCK STAB	———	———

	TRANSMITTER	NOMINAL	GUAR
40	PWR OUTPUT	700 MW	500 MW
41	DC PWR IN TO FINAL	———	3.5 W
42	OUT FREQ STAB (TEMP)	———	±.00025% MAX

NO	TRANSMITTER	NOMINAL	GUAR
43	OUT FREQ STAB (VOLT)		±.0001% (MAX)
44	SPUR & HARM CONDUCTED	-55 dB	-50 dB
45	SPUR & HARM RADIATED	-55 dB	-50 dB
46	OPERATING BANDWIDTH	±750 KHz FM. CTR.	———
47	EMISSION	———	16 F 3
48	MODULATION	———	± 5 KHz (MAX)
49	AUDIO FREQ DISTORTION	———	3 % (MAX)
50	FM HUM & NOISE	———	-60 dB (MIN)
51	AM HUM & NOISE	———	-34 dB (MIN)
52	AUDIO FREQ RESPONSE	———	EIA +1/-3:6 dB OUT PRE-EMPHASIS
53	TRANS CARRIER ATTACK	———	EIA: 100 MS (MAX)
54	SIDEBAND SPECTRUM	———	EIA: -55 dB (MIN)
55	HIGH HUMIDITY	———	———
56	VIBRATION STABILITY	———	———
57	SHOCK STABILITY	———	———

	MCCU04A & B
	MCCU01A & B
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
TOLERANCES ARE:
FRACT. ± DEC. .xx± .xxx± ANGLE ±

MATERIAL ———

FINISH ———

DO NOT SCALE DWG.

APPROVALS	DATE
DRAWN D.C.D.	8-19-80
CHECKED C.M.C	8-20-80
DFTG. SUPV.	
ENGR. DLF	8/80

Regency®
COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937

SPECIFICATIONS

MICRO COM U01A,B - U04A,B

SIZE B | PART NUMBER 304-248 | REV. A

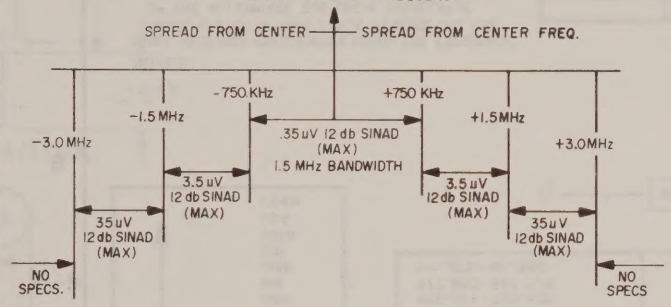
SCALE ——— | SHEET 1 OF 1

DWG. NO. 304-116 | SH 1 | REV. A

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	RELEASE R-016	9-7-78	BDJ

CHART 1

CENTER TUNE UP FREQUENCY



COMPUTATION TABLE (SEE NOTE 3)			
(STEP 1) RECEIVE FREQ	(STEP 2) LARGEST/SMALLEST	(STEP 5) SPREAD FROM CENTER	(STEP 6) WORST EXPECTED 12 db SINAD
F1-151.625 MHz	SMALLEST	-1.0 MHz	3.5 uV
F2-152.125 MHz		-.5 MHz	.35 uV
F3-152.625 MHz		CENTER	.35 uV
F4-153.625 MHz	LARGEST	+1.0 MHz	3.5 uV

NOTES:

1. THE CENTERMOST FREQUENCY SHOULD BE SELECTED TO TUNE THE RECEIVER.
2. RECEIVER SENSITIVITY DEGREDATION MAY BE COMPUTED BY FOLLOWING THE STEPS LISTED BELOW AND BY USING THE COMPUTATION TABLE TO THE LEFT.
3. STEP 1 - WRITE FREQUENCY DOWN
   STEP 2 - DETERMINE LARGEST AND SMALLEST VALUE
   STEP 3 - Δ = LARGEST - SMALLEST = BAND SPREAD
   Δ = 453.625 - 451.625
   Δ = 2.0 MHz
   STEP 4 - BEST CENTER FREQUENCY (BCF)
   BCF = SMALLEST + ($\Delta \div 2$)
   BCF = 451.625 + 2.0 MHz $\div$ 2
   BCF = 451.625 + 1.0 MHz
   BCF = 452.625
   IF BCF IS NOT F1, F2, F3 OR F4, CHOOSE CLOSEST VALUE & USE FOR BCF.
   STEP 5 - COMPUTE SPREAD FROM CENTER OF EACH FREQUENCY
   F1-BCF = 451.625 - 452.625 = -1.0 MHz
   F2-BCF = 452.125 - 452.625 = -0.5 MHz
   F3-BCF = 452.625 - 452.625 = CENTER
   F4-BCF = 453.625 - 452.625 = +1.0 MHz
   STEP 6 - COMPUTE WORST QUIETING FROM CHART 1
   F1 - -1.0 MHz (FALLS BETWEEN -750 KHz & -1.5 MHz) THEREFORE, READ DOWN THE COLUMN TO 3.5 uV
   F2 - SIMILAR TO F1
   F3 - SIMILAR TO F1
   F4 - SIMILAR TO F1

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACT. ± DEC. .XX ± .XXX ± ANGLE ±	APPROVALS	DATE
			DRAWN WWC	9-5-78
			CHECKED CWC	9-6-78
			DFTG. SUPV RB	9-7-78
		MATERIAL —	ENGR BDJ	9-7-78
	MCU 30	FINISH —		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DWG.		

Regency® COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937

SENSITIVITY PERFORMANCE DEGREDATION

SIZE B | PART NUMBER 304-116 | REV. A | SCALE — | SHEET 1 OF 1

BISHOP GRAPHICS/ACCUPRESS REORDER NO A-2306

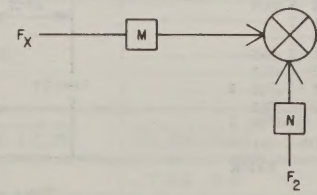
DWG. NO. 304-122 SH 1 REV. A

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	RELEASE R-069	10-6-78	DAJ

2nd LOCAL OSCILLATOR SELF QUIETING SPURS
MODELS AFFECTED
MICROCOM U01
U04
U10R
U10RH
U11
U11H
U11B
U11BH
U12
U12H
U14
U14H
U14B
U14BH
U15
U15H
U18
U18H
U31
U31H
U34
U34H

TABLE of SELF QUIETING SPURS
1st & 2nd ORDER 2nd LO GENERATED

RANGE OF SELF QUIETING SPURS FR in MHz	2nd LO FREQ (MHz) F2	HARMONIC ORDER M	HARMONIC ORDER N	ALTERNATE 2nd LO FREQ (MHz) F2
467.500 – 467.775	10.245	1	5	11.155
475.675 – 475.950		1	5	
469.600 – 469.750		2	10	
473.700 – 473.850		2	10	
470.325 – 470.400		3	15	
473.050 – 473.125		3	15	
501.050 – 501.150		3	16	
503.775 – 503.875		3	16	
508.450 – 508.725	11.155	1	5	10.245
464.450 – 464.600		2	9	
460.350 – 460.500		2	9	
510.550 – 510.700		2	10	
480.525 – 480.625		3	14	
477.800 – 477.900		3	14	
511.275 – 511.350		3	15	



FR CALCULATED FROM

a) $MFx \pm NF2 = \pm 455\,KHz \pm 15\,KHz$

b) $FR = \frac{9}{M} \left[Fx \pm (455KHz \pm 15KHz) \right] + 10.7\,MHz$

NOTES:

1. ALL RECEIVER FREQUENCIES WITHIN THE FREQUENCY RANGE LISTED IN THIS TABLE REQUIRE THE USE OF THE ALTERNATE 2nd LOCAL OSCILLATOR CRYSTAL FREQUENCY IN ORDER TO AVOID SELF QUIETING SPURS.

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACT. ± DEC. xx± .xxx± ANGLE ±	APPROVALS DRAWN dw	DATE 10-78
			CHECKED	
			DFTG. SUPV.	
		MATERIAL	ENGR. DAJ	10-78
	MCU 30	FINISH		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DWG.		

Regency COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937

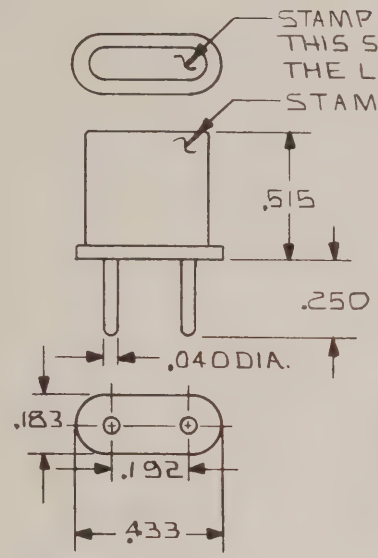
SELF QUIETING SPURS UHF

SIZE B PART NUMBER 304-122 REV. A

SCALE — SHEET 1 OF 1

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-2306

2328-0XXX-XXX	A
CRYSTAL Tx	



NOTES:

1. VENDOR MUST SUBMIT SAMPLE FOR APPROVAL BY CUSTOMER ENG. DEPT. ANY VARIATION FROM APPROVED SAMPLES WITHOUT PERMISSION FROM CUSTOMER ENG DEPT IS AT RISK OF THE VENDOR.
2. CRYSTAL IS A FUNDAMENTAL MODE MOUNTED IN A HC-25/U HOLDER.
3. NORMAL TRANSMIT FREQ RANGE: 450 - 512 MHZ.
4. CRYSTAL FREQ: $\frac{\text{TRANSMIT FREQ}}{36}$.
5. LOAD CAPACITY: 32 PF.
6. DRIVE LEVEL: 2.0 MW
7. CRYSTAL SERIES RESISTANCE: 25 OHMS MAX.
8. FREQ. CALIBRATION: ± .0015 @ 25°C.
9. FREQ TOLERANCE: ± .0005 % FROM 0°C TO +60 C.
10. C_1 = .025 PF ±10%.
11. C_o = 5.5 PF ±10%.

CRYSTAL FREQ RANGE: 12.5 MHZ TO 14.23 MHZ

REV	CHANGE	DATE
A	Rev WLO 6/7/75 Cust Mod 6-26-75	

THIS DRAWING IS PROPERTY OF REGENCY AND IS LOANED SUBJECT TO RETURN ON DEMAND AT THE SOLE RISK OF THE BORROWER FOR THE BASIS FOR THE MANUFACTURE OR SALE OF PRODUCTS WITHOUT PERMISSION

REFERENCE: mcu

302-539

Regency ELECTRONICS INC. INDIANAPOLIS 26 · INDIANA

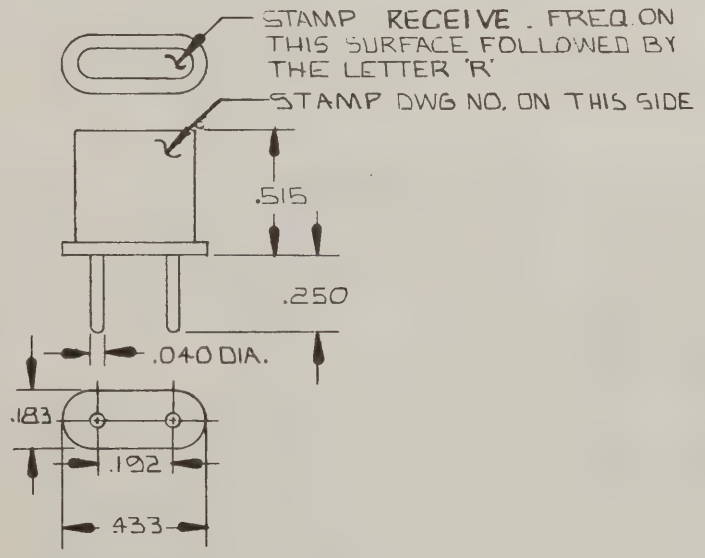
UNLESS OTHERWISE SPECIFIED
DEC. ± — FRACT. ± — ANGLES ± —
SCREW THREADS - AMERICAN NATIONAL CLASS

SCALE	DRAWN	CHECKED
NONE	R.V.	3/26/75

TITLE: CRYSTAL - TRANSMIT

DRAWING NO. 2328-0XXX-XXX SH. 1 OF 1 REV. A

2329-0XXX-XXX rev. A
CRYSTAL Rx



NOTES:

1. VENDOR MUST SUBMIT SAMPLE FOR APPROVAL BY CUSTOMER ENGINEERING DEPARTMENT. ANY VARIATION FROM APPROVED SAMPLES WITHOUT PERMISSION FROM CUSTOMER ENGINEERING DEPARTMENT IS AT RISK OF THE VENDOR.
2. CRYSTAL IS A 3RD OVERTONE MODE MOUNTED IN A HC-25/U HOLDER.
3. NORMAL RECEIVE FREQ RANGE: 450-512 MHz.
4. CRYSTAL FREQ: $\frac{\text{RECEIVER} - 10.7\ \text{MHz}}{9}$ CRYSTAL FREQ RANGE 48.8 to 55.7 MHz.
5. LOAD CAPACITY: 32PF
6. DRIVE LEVEL: 2.0MW
7. CRYSTAL SERIES RESISTANCE: 35 OHMS MAX.
8. FREQ. CALIBRATION $\pm$.001% @ 25°C.
9. FREQ TOLERANCE: $\pm$.001% FROM 0°C TO +60°C.
10. C_1 = .0017PF $\pm$20%.
11. C_0 = 5.5PF $\pm$10%.

REV	CHANGE	DATE
A	Rel WLO 6/2/75	6-22-75

THIS DRAWING IS PROPERTY OF REGENCY AND SHALL NOT BE REPRODUCED, COPIED OR USED AS THE BASIS FOR THE MANUFACTURE OR SALE OF PRODUCTS WITHOUT PERMISSION

REFERENCE mcu

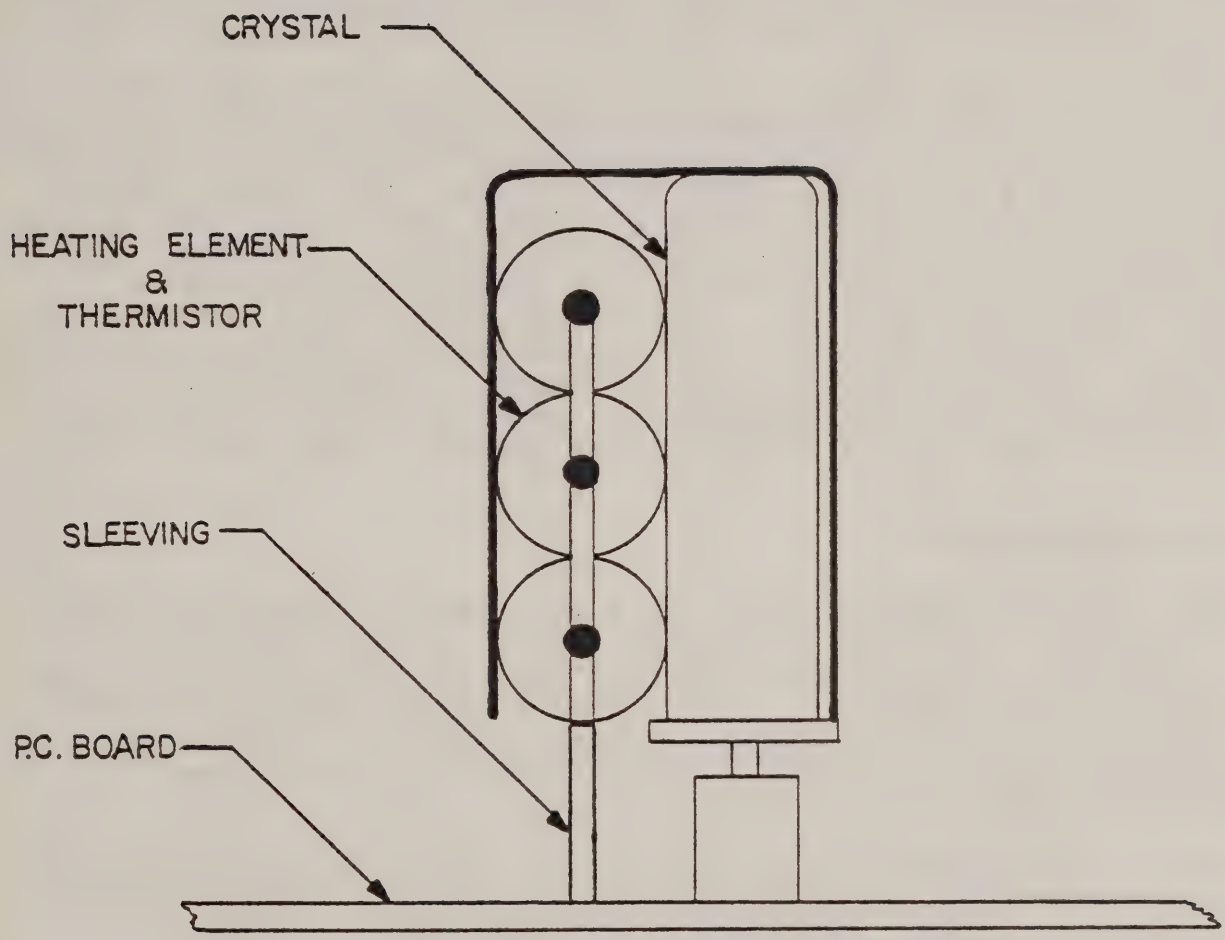
Regency ELECTRONICS INC. INDIANAPOLIS 26 · INDIANA

UNLESS OTHERWISE SPECIFIED
DEC. ± — FRACT. ± — ANGLES ± —
SCREW THREADS - AMERICAN NATIONAL CLASS

SCALE	DRAWN	CHECKED
NONE	RV	

TITLE
CRYSTAL - RECEIVE

302-540 DRAWING NO. 2329-0XXX-XXX SH 1 OF 1 REV A



1-1 CRYSTAL HEATING DETAIL

SECTION 2 - RECEIVER CIRCUIT DESCRIPTIONS

2-1 RECEIVER RF FRONT END, OSCILLATOR AND 1ST MIXER

The antenna is connected to a two-section RF helical filter, L205 and L206, which acts as a preselector for incoming signals.

Q203 is a grounded gate, low noise, J-FET amplifier. Its output is fed through an additional two-section helical filter, L212 and L213 and delivered to the gate of Q106, a J-FET mixer.

L.O. (Local Oscillator) injection for the J-FET mixer Q206, is a frequency of 10.7 MHz lower than the incoming signal frequency. It is obtained from a crystal oscillator-multiplier chain, consisting of Q201, Q202 and Q205. Q201 is a crystal oscillator, using a third overtone crystal in the 48.8 to 55.7 MHz range. The output circuit of Q201 oscillator is tuned to the third harmonic of the crystal frequency, and this harmonic is amplified by a buffer-amplifier consisting of Q202. Q202 drives Q205, which operates as a frequency tripler, providing the wanted local oscillator injection frequency. This wanted injection frequency is separated from various harmonics and subharmonics by the L215 and L216 section of the helical filter and delivered to the source of the mixer, Q206.

2-2 IF AUDIO CIRCUIT

The output of Q206 consists of a 10.7 MHz IF signal which is fed to a six-pole monolithic crystal filter, consisting of XF201, XF202 and XF203. This filter provides most of the adjacent channel selectivity of the receiver. The signal is then amplified by Q207. The amplified 10.7 MHz IF signal is then coupled to IC201 (terminal 18) which contains the second mixer circuitry and the second L.O. circuitry operating at 10.245 MHz.

The 455 KHz output of IC201 (terminal 3) is coupled through a tuned circuit to the input of the ceramic filter, CF201. CF201 is a narrow-band filter centered at 455 KHz, and it provides additional adjacent channel rejection. The output of CF201 goes back to IC201 (terminal 5) where it is amplified approximately 60dB Also included in IC103 is the limiting circuitry and a quadrature detector circuit. L220, connected between terminals 4 and 8 of IC201, is the adjustable quadrature coil.

The squelch noise from Pin AØ, leaves the receiver board to the squelch control. From the squelch control the noise returns to the input of the noise operated squelch circuit at Pin A1.

From Pin A1, the noise is filtered and then amplified by the internal squelch amplifier in IC201. The amplified noise is rectified by CR204 and CR207 and the DC voltage is applied to Pin 14 of IC201. From Pin 14 the voltage is applied to an internal squelch switch which pulls Pin 16 high with a receive signal. This high is applied to the base of Q204 and will cause it to conduct.

From Pin A3 the audio signal is coupled to the base of Q204. Q204 is an audio switch and emitter follower. The audio output from the emitter at Pin A4 leaves the receiver board to the volume control. From the arm of the volume control it returns to the receiver board at Pin A6. From Pin A5 the audio is amplified by IC202 to loudspeaker level.

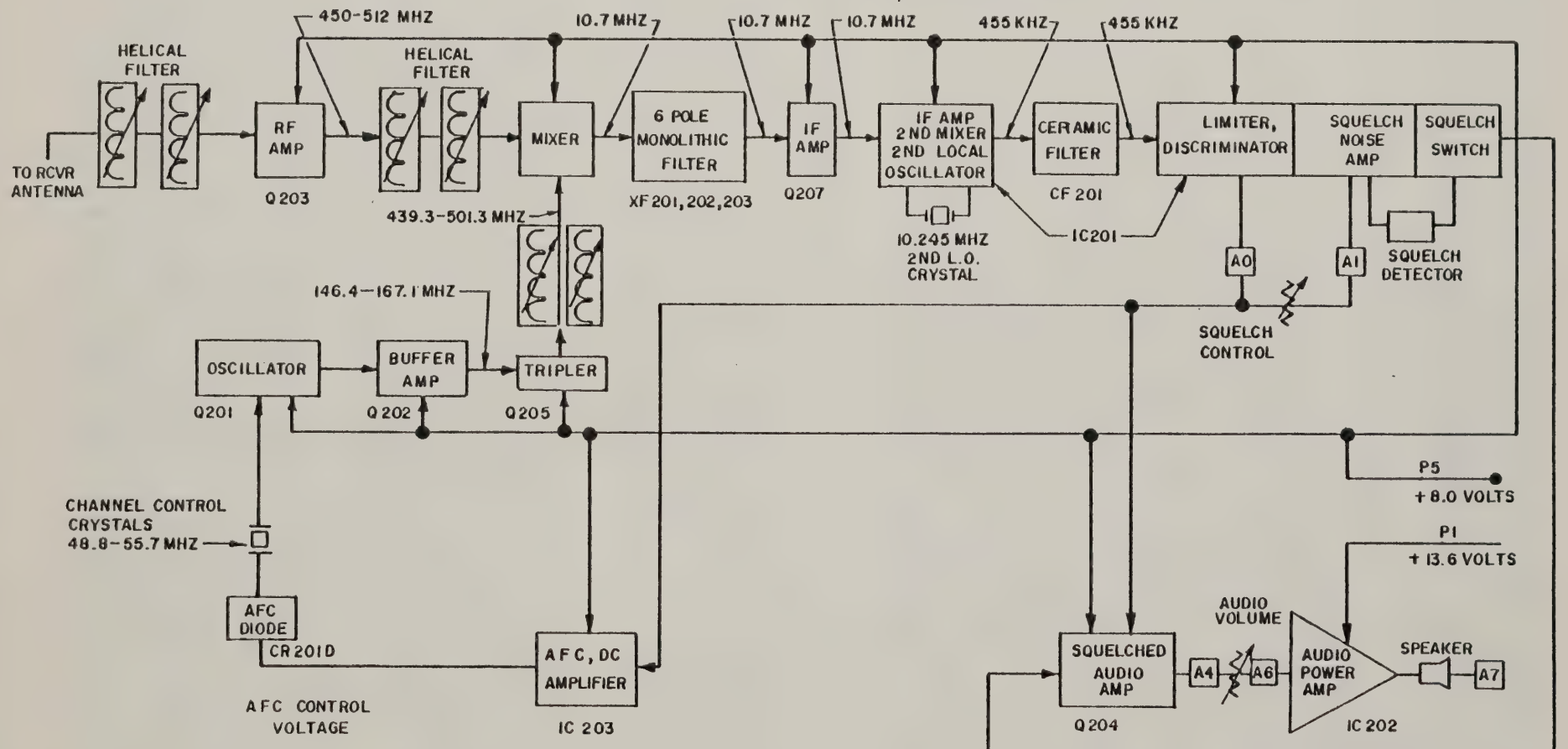
2-3 RECEIVER BLOCK DIAGRAM

See Drawing #104-353

DWG. NO.	SH.	REV.
104-353	1	A

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	RELEASE R-515	2-25-81	DLF



		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE FRACT. ± DEC. .XX± .XXX± ANG. ±	APPROVAL	DATE	Regency® COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937
			DRAWN CMC	2-24-81	
			CHECKED		
	MCCU15RA,B		DFTG. SUPV.		BLOCK DIAGRAM RECEIVER
	MCCU01RA,B	MATERIAL	ENGR. DLF	2-25-81	
	MCCU01A,B				
	MCCU04A,B	FINISH			SIZE A PART NUMBER 104-353 REV A
NEXT ASSY	USED ON				
APPLICATION		DO NOT SCALE DRWG			SCALE ~ SHEET 1 OF 1

SECTION 3 - TRANSMITTER CIRCUIT DESCRIPTIONS

3-1 AUDIO SECTION

Integrated Circuit IC201 (Sections A and B) constitutes the audio circuitry of the transmitter. IC301A provides a high impedance input for the ceramic microphone and supplies pre-emphasis and amplification prior to the modulation limiting circuit which consists of Q307 and Q308. IC301B provides additional amplifications and acts as an active filter to provide the post-limited filter action. The output of IC301B is fed to a control potentiometer which controls the audio voltage sent to the modulator section and, therefore, is used to set the peak modulation deviation of the transmitter.

IC301B also provides an amplified input to feed tones for continuous tone squelch systems, or other tone systems, into the transmitter modulation circuits.

3-2 CRYSTAL OSCILLATOR

Y301A serves as the crystal oscillator, using a crystal at 1/36 of the channel frequency. The crystal is a fundamental cut, in the frequency range 12.5 to 14.3 MHz.

Direct frequency modulation of the crystal is obtained by applying the modulation signals from the audio section to varactor modulator diode, CR301A.

3-3 FREQUENCY MULTIPLIER SYSTEM

The output of the crystal oscillator, Q301, is tuned to three times the crystal frequency, and this signal is amplified by buffer-amplifier Q302, then delivered to the tripler circuit, Q303, then delivered to the doubler circuit, Q304. Q304 drives another doubler, Q305, to obtain a combined frequency multiplication of 36 to reach the channel freuqencies from 450-512 MHz. The doubler Q305 develops about 600 milliwatts of power.

3-4 VSWR SYSTEM

The VSWR system is a part of the external power amplifier and controls the voltage to the collector of Q305. For test purposes when not used with the external amplifier, the VSWR line must be connected to keyed +13.6 volt line (Pin 2 to Pin 3 of the control socket on rear of repeater chassis).

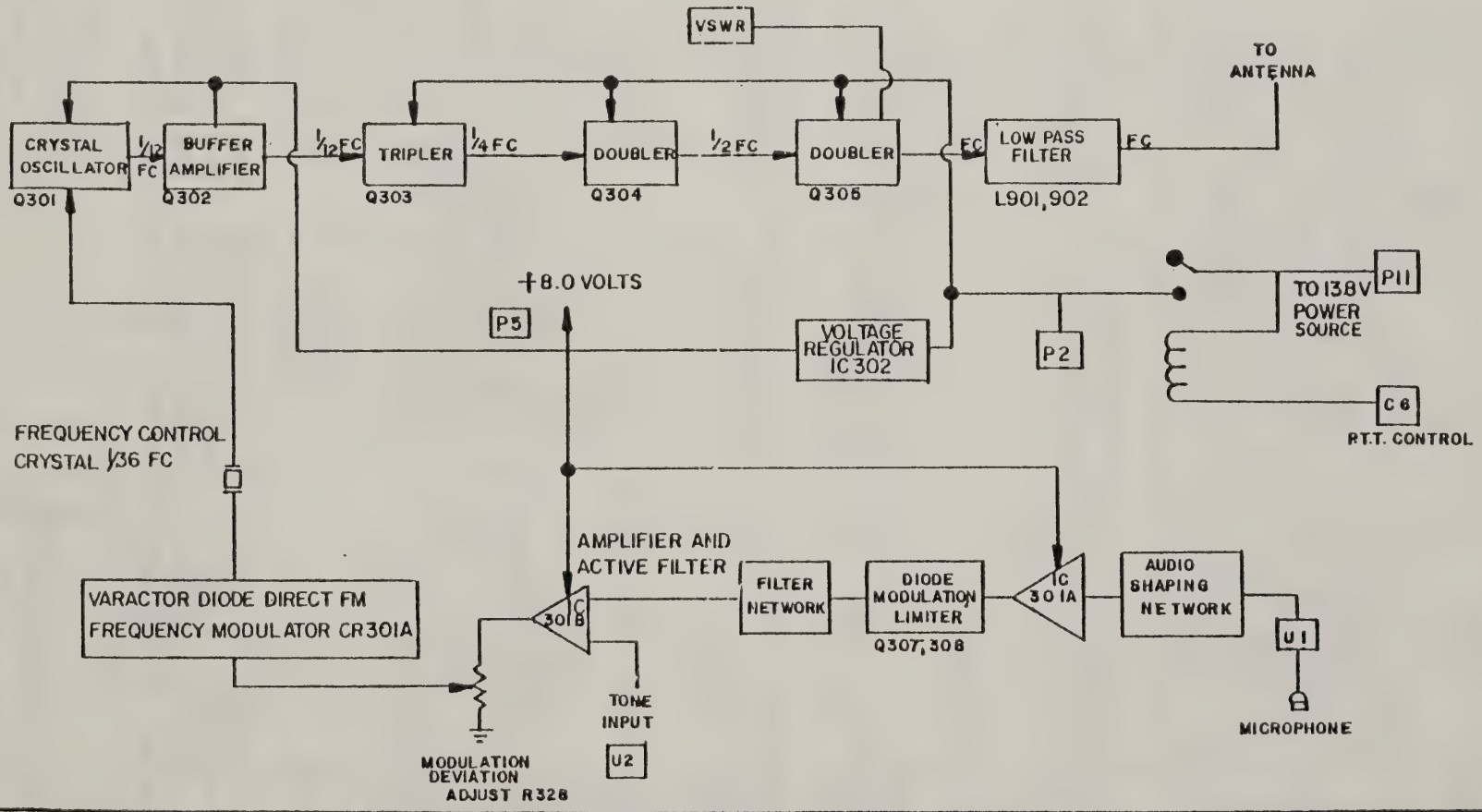
3-5 TRANSMITTER BLOCK DIAGRAM

See Drawing #104-355

DWG. NO.	SH.	REV.
104-355	1	A

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	RELEASE R-515	2-25-81	DLF



		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE FRACT. ± DEC. .XX± .XXX± ANG. ±	APPROVAL	DATE	Regency® COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937
			DRAWN dW		
			CHECKED		
			OPTG. SUPV.		
		MATERIAL	ENGR. DLF	2-25-81	BLOCK DIAGRAM TRANSMITTER
	MCCU04 A,B				
	MCCU01 A,B	FINISH			SIZE A · PART NUMBER 104-355 · REV A
NEXT ASSY	USED ON				
APPLICATION		DO NOT SCALE DRWG			SCALE ~ · S 1 OF 1

SECTION 4 - ALIGNMENT AND TUNING PROCEDURES

4-1 TRANSMITTER AND RECEIVER ALIGNMENT

See Test Procedure TP-14-351

APPLICATION	
NEXT ASSY	USED ON
	MCCU01/04

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	R-520	2/25/81	DLF
B	AB 807	6/2/81	DLF

REV B | SH 1 | DWG. NO. TP-14-351

TEST PROCEDURE

MICRO COM U01/04 19" RACK MOUNT UHF TRANSCEIVER

I. Test Set-Up (Refer to Figure 1)

1. MCCU01/04 Transceiver
2. DC Power Supply 13 VDC @ 2A
3. Audio Generator
4. R.F. Signal Generator
5. 450 MHz Thruline Wattmeter, 1W element
6. 30dB Power Pad
7. Frequency Counter*
8. Deviation Meter*
9. Spectrum Analyzer
10. UHF Notch Filter
11. HP410 DC VTVM
12. Sinadder or Distortion Meter with 1 KHz notch filter
13. AC VTVM
14. Audio Oscilloscope
15. PTT Switch
16. DC Voltmeter
17. 10.7 MHz Oscillator
18. AC VTVM
19. Microphone Matching Network
20. Audio Generator
21. MCCU Short Protector
22. Temperature Indicator

*May be replaced with Cushman or similar equipment.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE FRACT. ± DEC .XX± .XXX± ANG. ±	APPROVALS	DATE
	DRAWN CM	2/20/81
	CHECKED	
	DFTG. SUPV.	
MATERIAL	ENGR. DLF	2/25/81
FINISH		
DO NOT SCALE DRWG.		

Regency® COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937

TEST PROCEDURE
MICRO COM U01/04 19" RACK MOUNT UHF TRANSCEIVER

SIZE	PART NUMBER	REV.
A	TP-14-351	B

SCALE	SHEET
	1 OF 8

II. Set-Up Instructions

A. DC Input Short to Ground Test

1. Set S1 to Position A. Connect external DC power to P1.
2. If D2 (red) is on, B+ is shorted to ground in receiver.
3. If B+ is not shorted to ground switch S1 to Position B. Power on indication should be on. Reset S1 to Position A.
4. Install P2, key transmitter; if D2 is on, B+ shorted in transmitter.

B. Preliminary Preparations for Transmitter Testing

1. Insert tune-up crystal; set S1 to Position B.
2. Connect transmitter output to load.
3. Insert PTT keying switch.
4. Preset C348 for maximum capacitance.

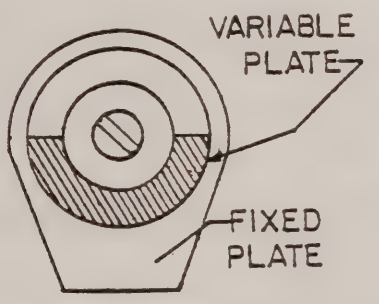


Figure 4 - Preset C348 for maximum capacitance

C. Preliminary Preparations for Receiver Testing

1. Insert tune-up crystal. Both transmit and receive tune-up crystals are selected as follows:

Freq Range	450-476 MHz	470-512 MHz
Frequency	462 MHz	492 MHz

2. Set UHF-FM signal generator (2) to tune-up crystal frequency as measured on frequency counter (9).
3. Preset L210 as follows: above 465 MHz, screw the slug all the way into the coil; below 465 MHz screw the slug out to the top of the coil.

III. Transmitter Tune-Up

A. VTVM metering - Metering point M1 must be referenced to ground, but metering points M2 through M4 may be referenced to ground or to 13.6V. Key transmitter with external PTT and key only when measuring or tuning.

1. Monitor M1. Tune L304 and L305 for minimum positive voltage. A reading of 2.1V indicates oscillator, Q301, is not oscillating.

The following metering points will be described referenced to 13.6 VDC. The VTVM is set in the -DCV position and all test points are peaked. To reference to ground, set the VTVM in the +DCV position and dip all test points. Either way the voltage difference between tuned and not tuned will be identical.

2. Monitor M2. Alternately tune L306 and L307 for maximum negative voltage. Tune L310 for a minimum. Voltage should be -2.5V to -3.0V. A reading of 0V indicates Q303 stage has no output.

3. Monitor M3. First tune L312 for maximum negative voltage, then tune L311. Tune L316 for a minimum. Voltage should read -3.5V to -5.0V when tuned. A reading of 0V indicates Q304 stage has no output.

4. Monitor M4. Tune L316 for maximum negative voltage, then tune L317 for maximum negative voltage. Voltage should read -2.5 VDC. A reading of 0V indicates Q305 stage has no output. Tune C348 for minimum negative voltage at M4. Voltage dip should be to -1.5 VDC.

B. Connect counter (7) to the output of the 30dB attenuator (6) and set the F1 warp control, L301A to the nominal crystal frequency $\pm$100 Hz.

C. Conducted spurious emissions measurement. Tune band reject filter (10) so that the carrier is not notched and set the spectrum analyzer (9) carrier indication to the 0dB reference line. Tune the band reject filter to attenuate the carrier at lease 30dB. All harmonics should be 50dB or more lower than the reference.

D. Deviation adjustment

1. Connect audio generator (20) to microphone input. Set the generator for 1 KHz at 1 VAC. Connect the deviation meter (8) to the attenuator (6) on the meter.

2. Key the transmitter and adjust R328 for $\pm$5 KHz deviation as measured on the meter.

E. Check the modulation sensitivity by reducing the audio generator output until the deviation is $\pm$3 KHz. The measured generator output on the AC VTVM (18) should be less than 20mv rms.

F. The crystal heater circuit can be checked in two ways. The check must be made at 25°C (76°F) after the DC voltage to the transceiver has been turned on for at least 3 minutes. In the preferred test, the sensor of the temperature indicator (22) is positioned between the crystal clip and the crystal in the transmitter section only. The reading must be

within 49°C to 59°C on both. Alternately the voltage at the collector of Q306 must be within 6.0 to 8.0 VDC.

IV. Table of Performance Limits for Transmitter

PARAMETER	MIN	TYP	MAX	UNITS
M1	+2	+1.8	+1.6	VDC
M2	0	-2.5	-3.5	VDC
M3	0	-3.5	-5	VDC
M4	0	-1.5	-2	VDC
Deviation	-	-	±5.0	KHz
Mic Mod Sens	-	10	20	mVac
Xtal Temp at 25°C	49	54	59	°C
Collector Q306 at 25°C	6.0	7.0	8.0	VDC
MICRO COM U01/04				
Tx Power Output	.5	.8	1.2	W
DC current	1	1.1	1.2	A

V. Receiver Alignment Procedure

A. Connect AC VTVM (13) across the speaker load and adjust the ON-OFF Volume Control for a readable VTVM reading on the 1 VAC scale.

B. Monitor K11 with DC VTVM (11). Inject strong 10.700 MHz signal into the vicinity of L319 and Q207. Set K11 to 3.5 VDC by adjusting L220.

C. Monitor M8 with the DC VTVM (11). Adjust L204 for minimum voltage at M8. A voltage dip of 0.05V from the oscillator off to the oscillator on should be observed. A reading of 0.6 VDC indicates no drive to Q205.

D. Modulate signal generator (3) with a 1 KHz tone at +3 KHz deviation. Increase generator output for 6dB SINAD on sinadder (12).

E. Adjust L205, L206, L212 and L213 for best 12dB SINAD by constantly reducing the signal generator output for 12db SINAD.

F. Adjust L215 and L216 for best 12dB SINAD.

G. Monitor K11 with DC VTVM. Adjust L201A to 3.5V.

H. Increase deviation to ±6 KHz. Adjust L218 and L219 for best 12dB SINAD.

I. Set the signal generator (3) for a 1 KHz tone at ±3 KHz deviation. Adjust the generator output for 12dB SINAD. The generator should read no more than .35 uv.

J. Increase the signal generator output to 100 uv and turn the volume control R3 to full volume. The AC VTVM (13) should exceed 4.0 VAC.

K. Set the signal generator to -130dBM and remove the modulation. Set AC VTVM (13) to the 1V scale and use the volume control to set voltage to 1.0 VAC. Increase the signal generator output until the AC VTVM reads 0.1 VAC. This is 20dB quieting and the generator should read less than 0.5 uv.

DRAWN		DATE	SIZE	PART NUMBER	REV.
APPROVED	DLF	DATE 2/25/81	A	TP-14-351	B
DO NOT SCALE DWG.			SCALE		SHEET 1

DWG. NO. TP-14-351 SH 1 REV. B

L. Set the signal generator (3) output to -130dBm. Set the squelch control R2 to threshold, just quieting the receiver noise. Increase the signal generator output until noise appears. This is threshold squelch and the generator should read less than .25 uv.

M. Turn the squelch control fully counter-clockwise. Increase the signal generator output until the squelch opens. This is tight squelch and the generator should read less than 0.7 uv.

N. Monitor K11 with DC VTVM (11) set on 10V scale. Set signal generator (3) for 100 uv and offset the frequency +3.0 KHz from the crystal frequency. Voltage at K11 should increase from 3.5 VDC on frequency to at least 4.5 VDC with +3.0 KHz offset.

VI. Table of Performance Limits

PARAMETER	MIN	TYP	MAX	UNITS
M8				
12dB SINAD	-	.5	.55	
20DBQ	-	.3	.35	
Threshold Squelch	-	.4	.5	
Tight Squelch	-	.2	.25	
Audio Output 1 KHz Tone		.55	.7	
3 KHz Dev	4.0	4.2	-	
Noise Output	4.0	4.2	-	
K11 +3 KHz offset	4.5	6.0		

VII. Specifications and Other Data Pertinent to Micro Com U01/04

A. Specifications

1. Drawing #304-116
2. Drawing #304-248

B. Schematics

1. Drawing #704-131
2. Drawing #504-508

VIII. Test Procedure for Broadband Transmitter Tuning (Double-Tuned)

The broadband tuning procedure is required only if the difference between the highest frequency and the lowest frequency exceeds 1.5 MHz. After the transmitter has been center-tuned, the following steps are performed to broadband the transmitter. All metering voltages referenced to 13.6 VDC.

1. Monitor M2 with VTVM(2) on -10 VDC scale.
2. Set the frequency selector to the channel with the lowest frequency. Note voltage reading on VTVM.
3. Set the frequency selector to the channel with the highest frequency. Note VTVM reading.
4. Tune L305 and L307 such that the voltage reading at M2 is the same at both the highest frequency and the lowest frequency.
5. Monitor M3. Repeat Steps 2 and 3. Tune L310, L311 and L312 for maximum negative voltage at both the highest frequency and the lowest frequency. Voltage should be at least -3.0 VDC.
6. Monitor M4. Repeat Steps 2 and 3. Tune L316 for maximum negative voltage at both the highest frequency and the lowest frequency. Voltage should be about -1.0 VDC.
7. Monitor RF output on wattmeter. Repeat Steps 2 and 3. Tune L317 and C348 for maximum power out at both the highest frequency and the lowest frequency.

DWG. NO. TP-14-351 SH. 1 REV. B

TEST INTERCONNECTION DIAGRAM FOR MCCU01/04

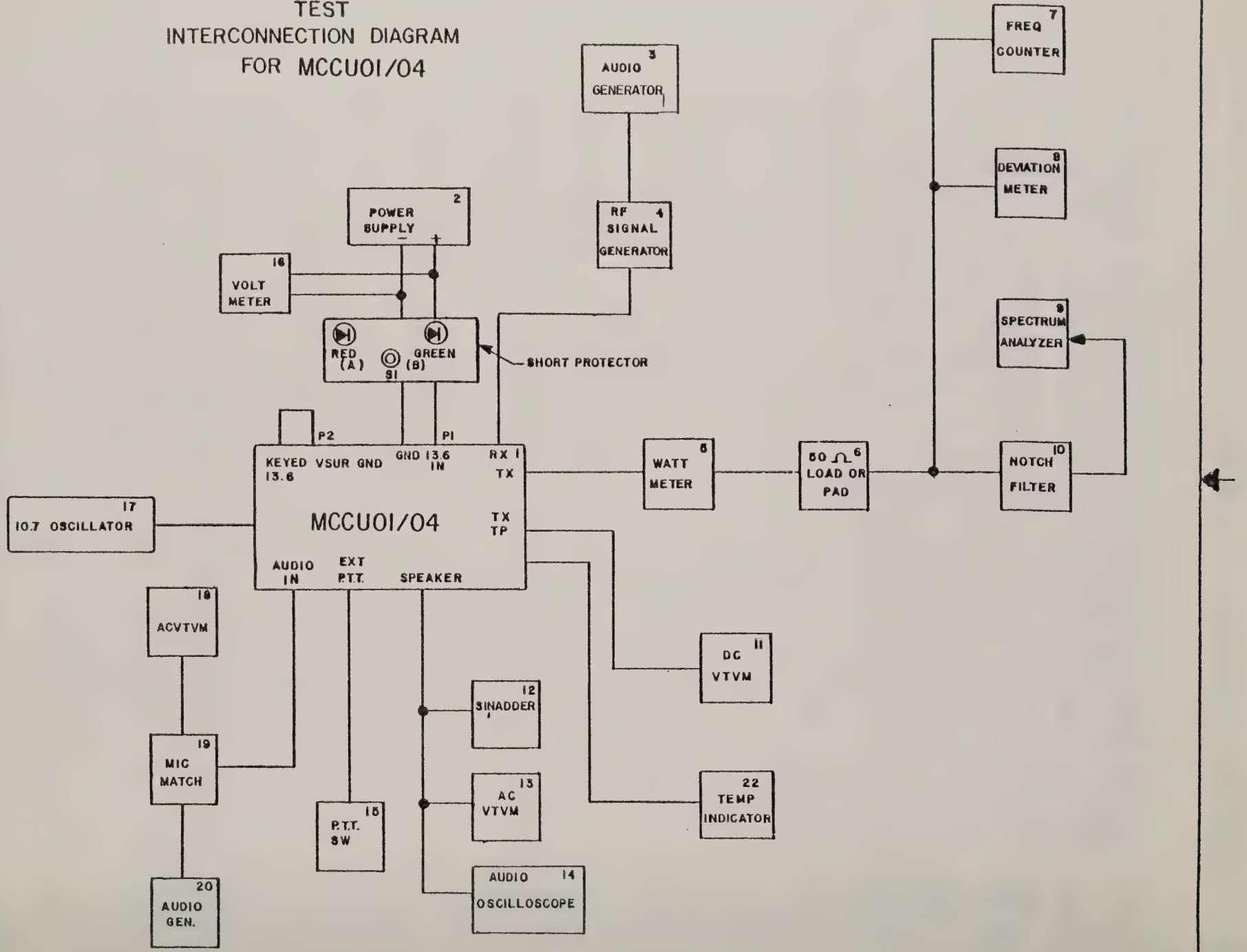


FIGURE -

DRAWN DLF
APPROVED -
DATE 2/23/91
DO NOT SCALE DWG.
SIZE A
SCALE
PART NUMBER TP 14-351
SHEET 7
REV. B

TUNING POINTS

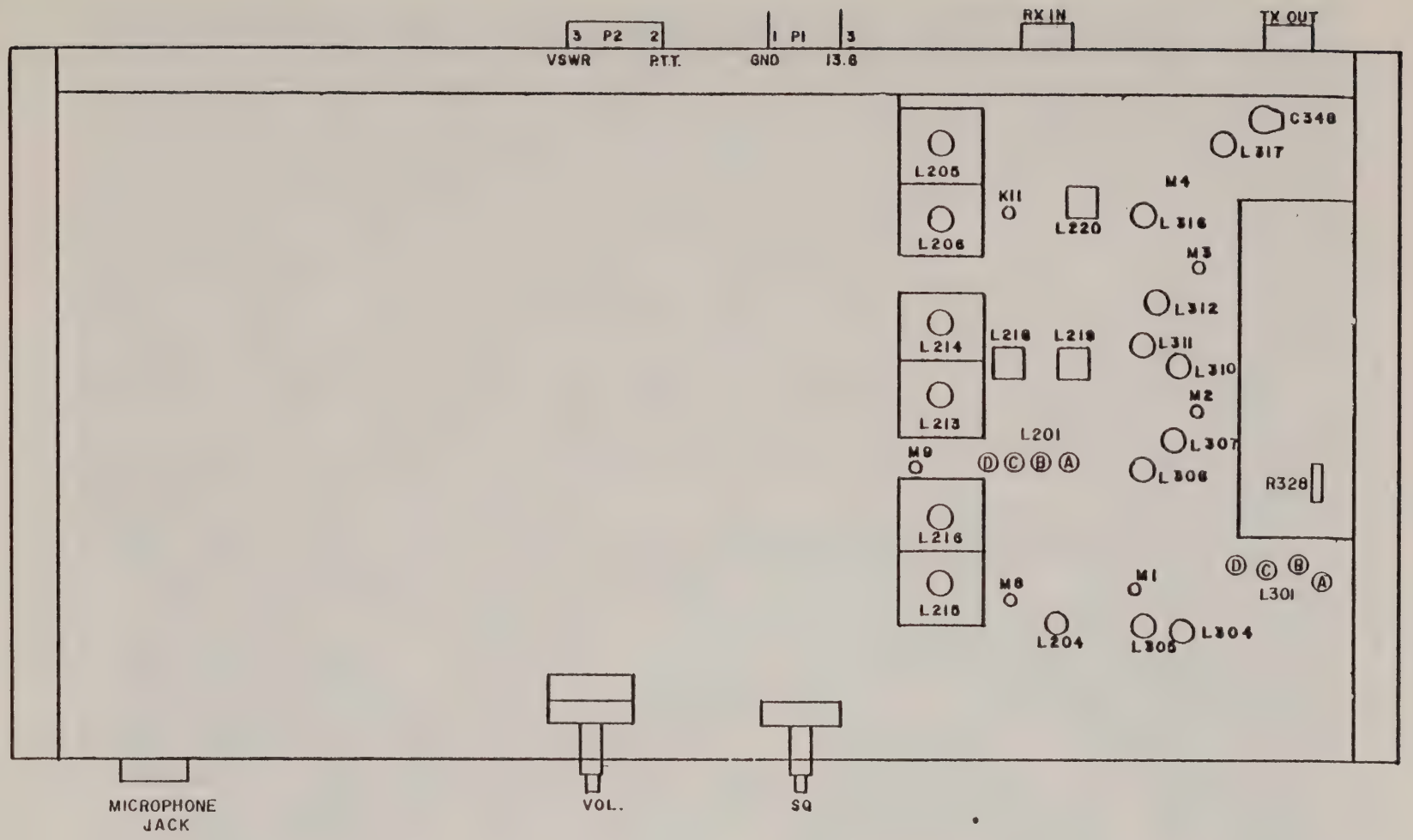


FIGURE - 2

SECTION 5 - DIAGRAMS, VOLTAGE DATA AND SCHEMATICS

5-1 MAIN BOARD PARTS PLACEMENT/SILKSCREEN (DWG. #704-062)

5-2 MAIN BOARD PARTS OVERLAY DIAGRAM (DWG. #704-066)

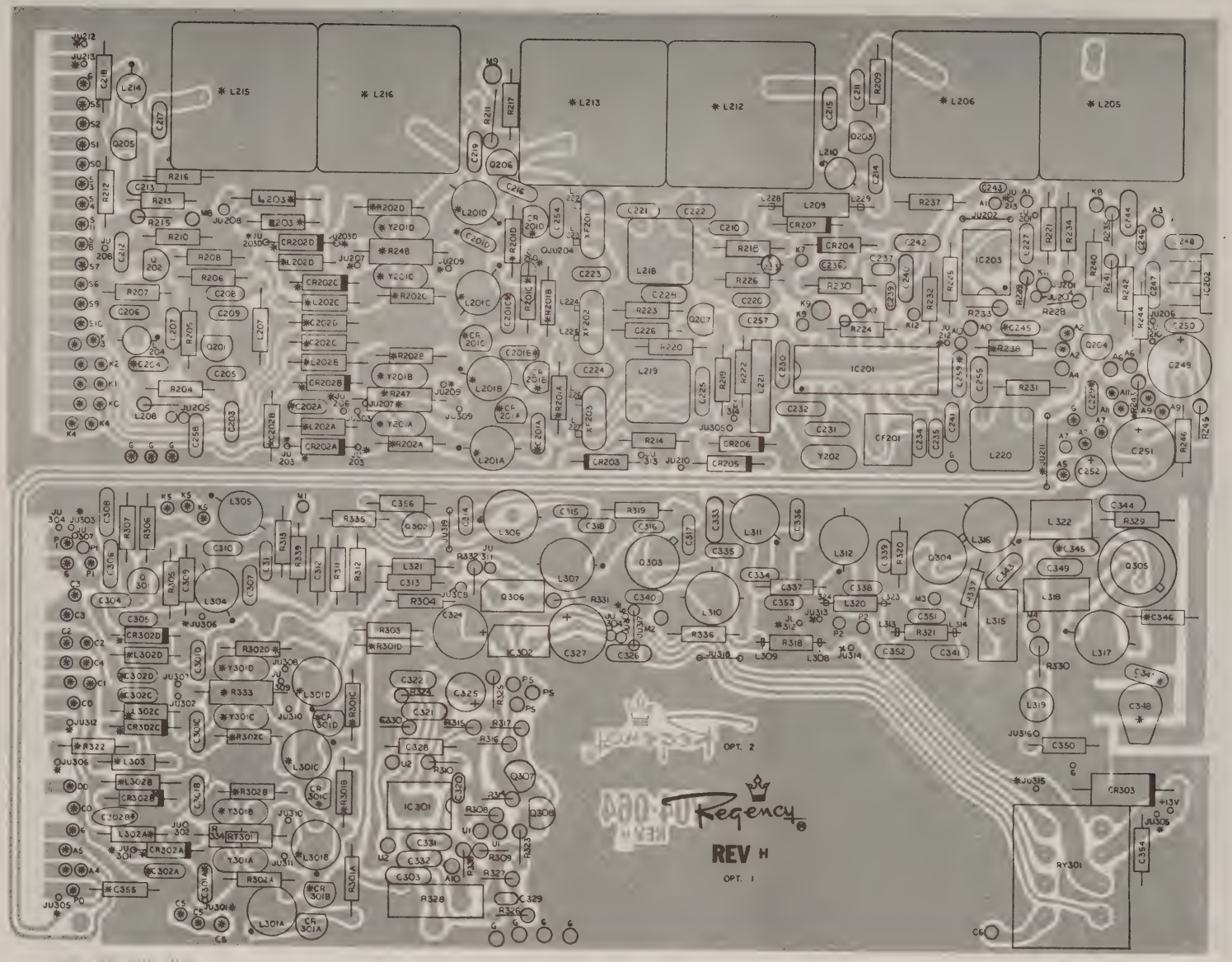
5-3 MAIN BOARD SCHEMATIC DIAGRAM (DWG. #704-131)

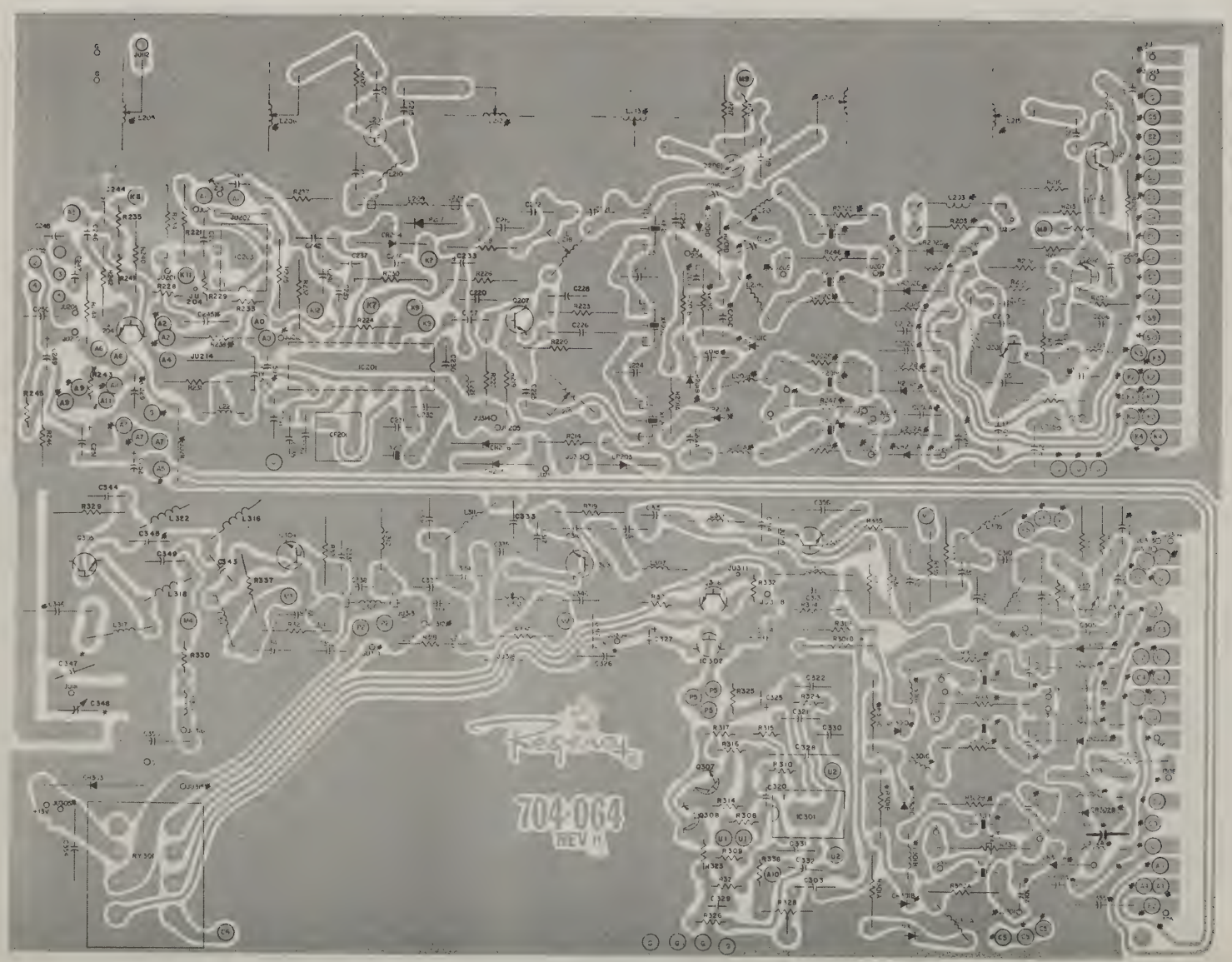
5-4 MAIN BOARD JUMPER DIAGRAM (DWG. #704-066)

5-5 RECEIVER VOLTAGE DATA

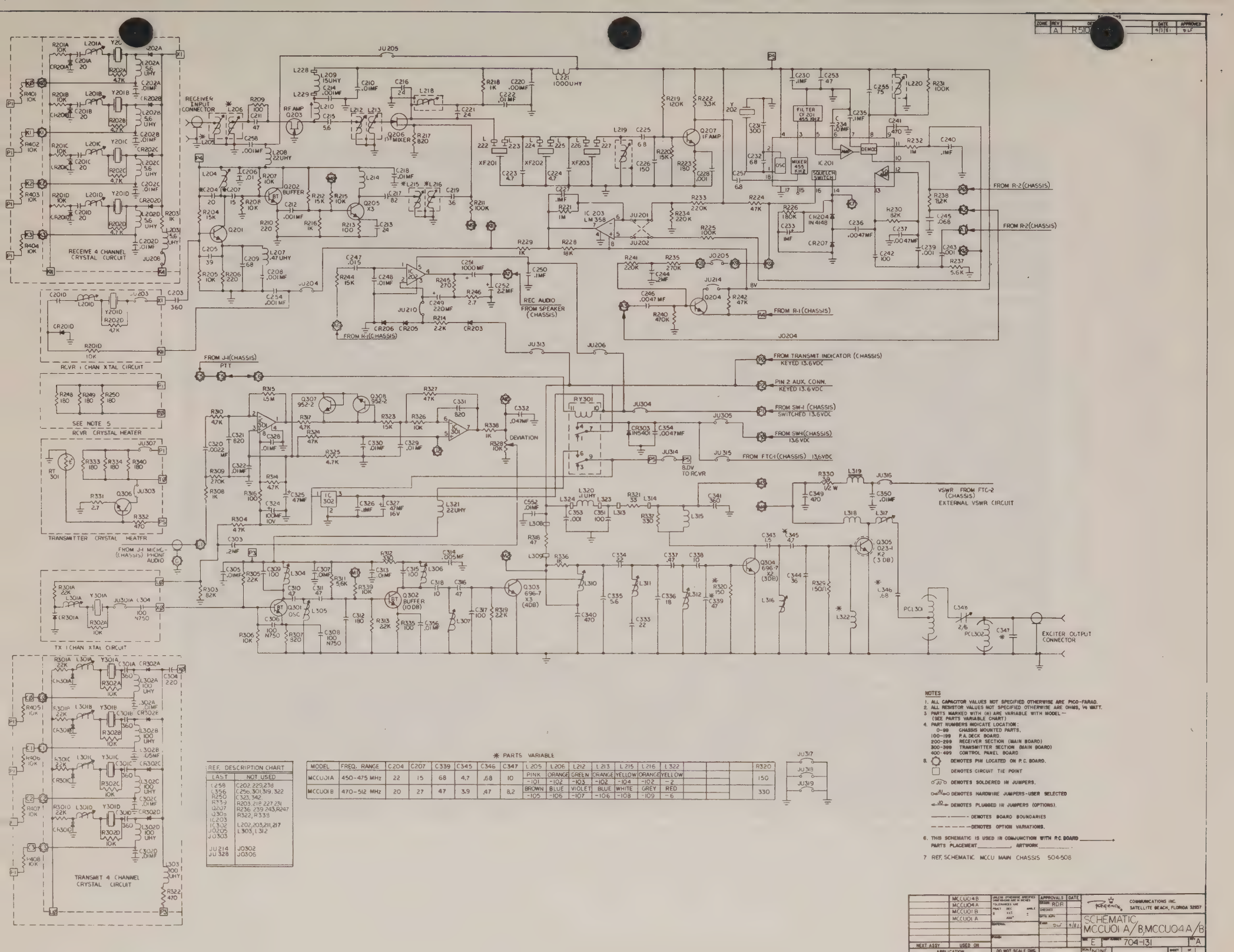
5-6 TRANSMITTER VOLTAGE DATA

5-7 MAIN CHASSIS SCHEMATIC (DWG. #504-508)


Regency
REV H
OPT. 1
OPT. 2



A.W. NO. 704-061



REF. DESCRIPTION CHART	
LAST	NOT USED
C258	C202,229,238
C356	C256,301,319,322
R250	C323,342
R339	R203,218,227,231
Q207	R236,239,243,R247
J0205	R322,R339
IC203	L202,203,211,217
IC302	L303,L312
J0205	
JU214	J0302
JU328	J0306

* PARTS VARIABLE

MODEL	FREQ. RANGE	C204	C207	C339	C345	C346	C347	L205	L206	L212	L213	L215	L216	L322				R320
MCCU01A	450-475 MHz	22	15	68	4.7	.68	10	PINK	ORANGE	GREEN	ORANGE	YELLOW	ORANGE	YELLOW				150
								-101	-102	-103	-102	-104	-102	-2				
MCCU01B	470-512 MHz	20	27	47	3.9	.47	8.2	BROWN	BLUE	VIOLET	BLUE	WHITE	GREY	RED				330
								-105	-106	-107	-106	-108	-109	-6				

JU317 JU318 JU319

NOTES

1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE PICO-FARAD.
2. ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, ¼ WATT.
3. PARTS MARKED WITH (R) ARE VARIABLE WITH MODEL — (SEE PARTS VARIABLE CHART)
4. PART NUMBERS INDICATE LOCATION:
   - 0-99 CHASSIS MOUNTED PARTS.
   - 100-199 P.A. DECK BOARD.
   - 200-299 RECEIVER SECTION (MAIN BOARD)
   - 300-399 TRANSMITTER SECTION (MAIN BOARD)
   - 400-499 CONTROL PANEL BOARD
5. ○ DENOTES PIN LOCATED ON P.C. BOARD.
   □ DENOTES CIRCUIT TIE POINT
   ○—○ DENOTES SOLDERED IN JUMPERS.
   ○—○ DENOTES HARDWIRE JUMPERS-USER SELECTED
   ○—○ DENOTES PLUGGED IN JUMPERS (OPTIONS).
   ——·——·—— DENOTES BOARD BOUNDARIES
   — — — — — DENOTES OPTION VARIATIONS.
6. THIS SCHEMATIC IS USED IN CONJUNCTION WITH P.C. BOARD ——→ PARTS PLACEMENT _____, ARTWORK _____.
7. REF. SCHEMATIC MCCU MAIN CHASSIS 504-508

	MCCU04B	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACT ±1/32 DEC ±.XX ANGLE ±2° ASST ±	APPROVALS	DATE	COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937
	MCCU04A		DESIGN RDR		
	MCCU01B		CHECKED		
	MCCU01A		DRFTS RDR		SCHEMATIC MCCU01 A/B, MCCU04 A/B
		MATERIAL	DWG	9/81	
		FINISH			SIZE E DRAWING NUMBER 704-131 REV A
NEXT ASSY	USED ON				
APPLICATION		DO NOT SCALE DWG.			SCALE NONE SHEET OF

130-804 .ON .WA

5-5 RECEIVER VOLTAGE DATA

Voltage on active component MCCU01, U04

	With Drive			No Drive		
	E	B	C	E	B	C
Q201	2.2v	2.7v	8.2	2.2	2.9	8.2
Q202	3.2	3.7	8.2	3.3	4.2	8.2
Q205	.7	.54	8.2	0	.6	8.2
Q207	.2	.85	5.2	.2	.85	5.2

	S	G	D	S	G	D
Q203	1.2	0	7.8	1.2	0	7.8
Q206	.71	0	6.8	.64	0	6.8

	E	B	C	E	sq. on B	C
Q204	2.4	3	8.2	.9	0	8.2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
IC201	8.0	7.6	7.7	8.2	1	1	1	8	4	3.4	4.1	2.2	2.2		7.6	7.5	0	2
sq. on	8	7.6	7.7	8.0	1	1	1	8	4	3.4	4	2.2	2.2	.6	0	0	0	2

	1	2	3	4	5
IC202	.7	.6	0	6.7	13.6
Sq.	.7	.6	0	6.7	13.6

	1	2	3	4	5	6	7	8
IC203	7	5.5	5	0	3.4	4.0	2.8	8.2
K11	3.5							

5-6 TRANSMITTER VOLTAGES

Voltage on active components MCCU01, U04

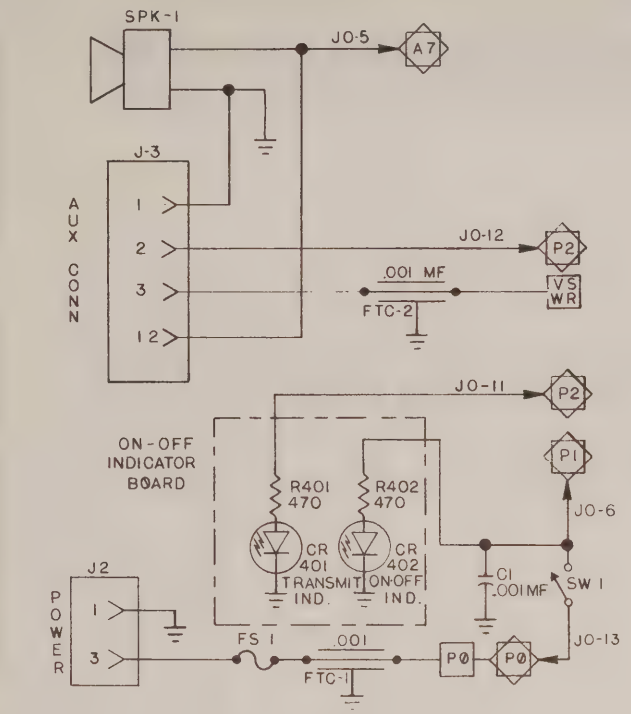
	With Drive			No Drive		
	E	B	C	E	B	C
Q301	1.8	2.2	8	1.7	2.3	8.2
Q302	1.4	1.8	3.1	1.4	2.2	3.6
Q303	0	-1.5	10.5	0	0	13.6
Q304	0	- .75	9.5	0	0	13.6
Q305	0	0	11.5	0	0	13.6
Q306	.2	.9	13.6			
Q307	4	3.9	3.9			
Q308	3.9	4	4			

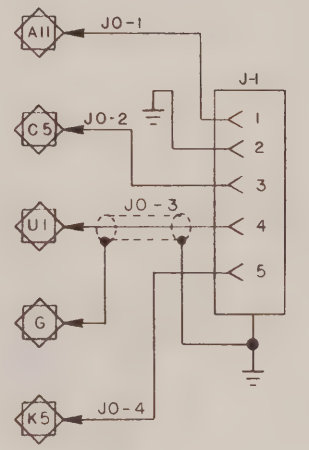
	1	2	3	4	5	6	7	8
IC301	3.8	3.8	3.8	0	3.8	3.8	3.8	8

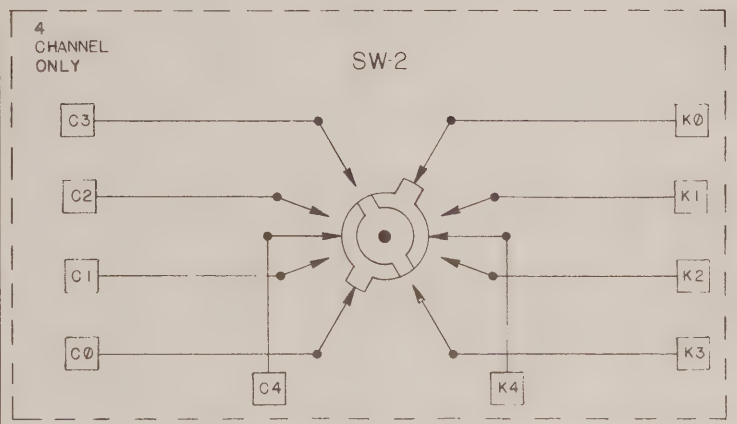
	1	2	3
IC302	8.2	0	3.6

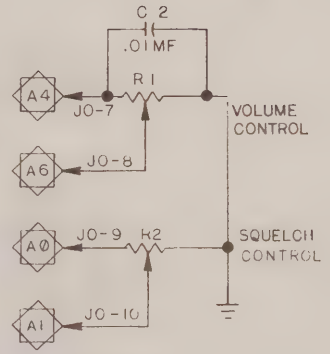
	M1	M2	M3	M4
Tuned	1.5	10.2	9	12
No Drive	2.1	13.6	13.6	13.6

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	RELEASE A-512 DCD	2/20/81	DLF









NOTES

1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE PICO-FARAD.
2. ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, ¼ WATT.
3. PARTS MARKED WITH (*) ARE VARIABLE WITH MODEL — (SEE PARTS VARIABLE CHART).
4. PART NUMBERS INDICATE LOCATION:
   - 0-99 CHASSIS MOUNTED PARTS.
   - 100-199 P.A. DECK BOARD.
   - 200-299 RECEIVER SECTION (MAIN BOARD).
   - 300-399 TRANSMITTER SECTION (MAIN BOARD).
   - 400-499 CONTROL PANEL BOARD.
5. ⬡ DENOTES PIN LOCATED ON P.C. BOARD.
   □ DENOTES CIRCUIT TIE POINT.
   ○JU○ DENOTES SOLDERED IN JUMPERS.
   ○—JU—○ DENOTES HARDWIRE JUMPERS-USER SELECTED.
   ◄—JO—► DENOTES PLUGGED IN JUMPERS (OPTIONS).
   ———·——— DENOTES BOARD BOUNDARIES.
   — — — — — DENOTES OPTION VARIATIONS.
6. THIS SCHEMATIC IS USED IN CONJUNCTION WITH P.C. BOARD N A, PARTS PLACEMENT N A, ARTWORK N A.

DWG. NO. 504-508 SH 1 REV A

			APPROVALS	DATE
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACT ± DEC. .xx± .xxx± ANGLE ±	DRAWN DCD	2-81
			CHECKED	
	MCCU04B		DFTG. SUPV.	
	MCCU04A	MATERIAL	ENGR. DLF	2-81
	MCCU01B			
	MCCU01A	FINISH		
NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DWG.		

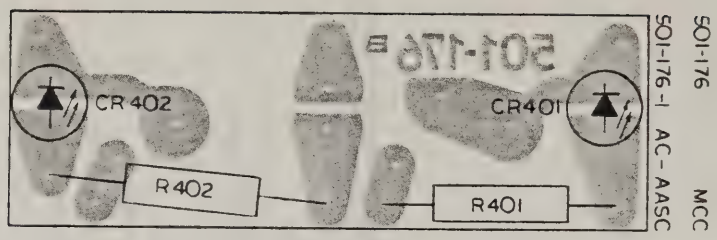
Regency® COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937

SCHEMATIC MCCU MAIN CHASSIS

SIZE C PART NUMBER 504-508 REV A

SCALE — SHEET 1 OF 1

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-2307



LED BOARD TOP VIEW

LED BOARD BOTTOM VIEW

5-8 LED BOARD

SECTION 6 - PARTS LIST

6-1 RECEIVER BOARD (Main Board 704-064)

RESISTORS (All Resistors are ±5%, ¼W, unless otherwise noted.)

LOCATION	DESCRIPTION	PART NO.	
R201A	10K ohms	4704-0103-032	(4ch only)
R201B	10K ohms	4704-0103-032	(4ch only)
R201C	10K ohms	4704-0103-032	(4ch only)
R201D	10K ohms	4704-0103-032	
R202A	4.7K ohms	4704-0472-032	(4ch only)
R202B	4.7K ohms	4704-0472-032	(4ch only)
R202C	4.7K ohms	4704-0472-032	(4ch only)
R202D	4.7K ohms	4704-0472-032	
R203	1K	4701-0102-042	(4ch only)
R204	15K	4704-0153-032	
R205	10K 1/4W 10%	4700-0103-042	
R206	220 ohms 1/4W 10%	4700-0221-042	
R207	10K 1/4W 10%	4700-0103-042	
R208	10K 1/4W 10%	4700-0103-042	
R209	100 ohms carb comp	4700-0101-042	
R210	220 ohms 1/4W 10%	4700-0221-042	
R211	100K	4704-0104-032	
R212	15K	4704-0153-032	
R213	100 ohms carb comp	4700-0101-042	
R214	2.2K 1/4W 10%	4700-0222-042	
R215	10K ohms	4704-0103-032	
R216	1K ¼W. 10%	4700-0102-042	
R217	820 ohms 1/4W 10%	4700-0821-042	
R218	1K	4704-0102-032	
R219	120K	4704-0124-032	
R220	15K	4704-0153-032	
R221	1 meg	4704-0105-032	
R222	3.3K ohms	4704-0332-032	
R223	180 ohms 1/4W 10%	4700-0181-042	
R224	47K ohms	4704-0473-032	
R225	100K	4704-0104-032	
R226	180K	4704-0184-032	
R227	not used		
R228	18K ohms	4704-0183-032	
R229	1K	4704-0102-032	
R230	82K	4704-0823-032	
R231	100K	4704-0104-032	
R232	1 meg	4704-0105-032	
R233	220K	4704-0224-032	
R234	220K	4704-0224-032	
R235	270K	4704-0274-032	
R236	not used		
R237	5.6K	4704-0562-032	
R238	8.2K ohms	4704-0822-032	
R239	not used		
R240	470K	4704-0474-032	
R241	220K	4704-0224-032	

LOCATION	DESCRIPTION	PART NO.	
R242	47K ohms	4704-0473-032	
R243	680 ohms	4704-0681-032	
R244	15K	4704-0153-032	
R245	330 ohms	4704-0331-032	
R246	2.7 ohms	4704-0279-032	
R247	not used		
R248	180 ohms comp ½W 10%	4700-0181-044	
R249	180 ohms comp ½W 10%	4700-0181-044	
R250	180 ohms comp ½W 10%	4700-0181-044	
CAPACITORS			
C201A	20PF 10% 50V(DISC)	1500-0200-650	(4ch only)
C201B	20PF 10% 50V(DISC)	1500-0200-650	(4ch only)
C201C	20PF 10% 50V(DISC)	1500-0200-650	(4ch only)
C201D	20PF 10% 50V(DISC)	1500-0200-650	
C202A	.01MF +8-2 50V(DISC)	1503-0103-007	(4ch only)
C202B	.01MF tub cer 30% 25V	1538-0103-804	(4ch only)
C202C	.01MF tub cer 30% 25V	1538-0103-804	(4ch only)
C202D	.01MF tub cer 30% 25V	1538-0103-804	(4ch only)
C203	360PF 5% 50V LCQ-17(MICA)	1506-0371-550	
C204	22PF 10% 50V NPO(DISC)	1500-0220-650	
C205	39PF 5% 500V NPO(DISC)	1500-0390-505	
C206	.01MF +8-2 50V(DISC)	1503-0103-007	
C207	15PF 10 5-0V NPO(DISC)	1501-0150-001	
C208	.001MF +8-2 50V(DISC)	1503-0102-003	
C209	68PF 5% 50V NPO(RD)	1524-0680-002	
C210	.01MF +8-2 50V(DISC)	1503-0103-007	
C211	47PF 5% 50V NPO(RD)	1524-0470-002	
C212	.001MF +8-2 50V(DISC)	1503-0102-003	
C213	24PF 10% 50V NPO(DISC)	1500-0240-650	
C214	.001MF +8-2 50V(DISC)	1503-0102-003	
C215	5.6PF 10$ 500V NPO(DISC)	1500-0569-905	
C216	24PF 10% 50V NPO(DISC)	1500-0240-650	
C217	82PF 5% 50V NPO(RD)	1524-0820-002	
C218	tub cer .01 30% 25V	2538-0103-804	
C219	36PF 5% 50V(DISC)	1500-0360-550	
C220	.001MF +8-2 50V(DISC)	1503-0102-003	
C221	24PF 10% 50V NPO(DISC)	1500-0240-650	
C222	.01MF +8-2 (DISC)	1503-0103-007	
C223	4.7PF 10% 500V NPO(DISC)	1500-0479-905	
C224	4.7PF 10% 500V NPO(DISC)	1500-0479-905	
C225	68PF 5% 50V NPO(RD)	1524-0680-002	
C226	150PF 10% 50V NPO (TM)	1539-0151-601	
C227	.1MF 20% 12V BC-12 (MC)	1502-0104-005	
C228	.001MF +8-2(DISC)	1503-0102-003	
C229	.01MF +8-2 50V(DISC)	1503-0103-007	
C230	.1MF 20% 12V BC-12(MC)	1502-0104-005	
C231	300PF 5% 50V LCQ-17(MICA)	1506-0301-550	
C232	68PF 5% 50V NPO(RD)	1524-0680-002	
C233	1 MF 20% 15V(TANT)	1515-0010-003	
C234	.01MF +8-2 50V(DISC)	1503-0102-007	
C235	.1MF 20% 12V BC-12(MC)	1502-0104-005	

LOCATION	DESCRIPTION	PART NO.	
C236	0047MF 10% 100V(MY)	1508-0472-610	
C237	0047MF 10% 100V(MY)	1508-0472-610	
C238	not used		
C239	.001MF 10% 100V(MY)	1508-0102-610	
C240	.1MF 20% 12V BC-12(MC)	1502-0104-005	
C241	470PF 10% 50V(DISC)	1523-0471-002	
C242	100PF 5% 50V LCQ-17(MICA)	1506-0101-550	
C243	.001MF 10% 100V(MY)	1508-0102-610	
C244	.2MF 12V +8-2(MC)	1502-0204-006	
C245	.068MF 10% 100V(MY)	1508-0683-610	
C246	0047MF 10% 100V(MY)	1508-0472-610	
C247	.015MF 10% 100V(MY)	1508-0153-610	
C248	.01MF 10% 100V(MY)	1508-0103-610	
C249	220MF 16V 85D(ELEC)	1513-0221-002	
C250	.1MF 20% 12V BC-12(MC)	1502-0104-005	
C251	220MF 16V 85D(ELEC)	1513-0221-002	
C252	2.2MF 20% 25V(TANT)	1515-0229-005	
C253	not used		
C254	.001MF +8-2 50V(DISC)	1503-0102-003	
C255	75PF 5% 50V NPO(RD)	1524-0750-002	
C256	not used		
C257	6.8PF 10% 500V NPO(DISC)	1500-0689-905	
C258	.001MF +8-2 50V(DISC)	1503-0102-003	
COILS			
L201A	coil variable	1800-3191-406	(4ch only)
L201B	coil variable	1800-3191-406	(4ch only)
L201C	coil variable	1800-3191-406	(4ch only)
L201D	coil variable	1800-3191-406	
L202A	choke 5.6 uhy	1802-0569-008	(4ch only)
L202B	choke 5.6 uhy	1802-0569-008	(4ch only)
L202C	choke 5.6 uhy	1802-0569-008	(4ch only)
L202D	choke 5.6 uhy	1802-0569-008	(4ch only)
L203	choke 5.6 uhy	1802-0569-008	(4ch only)
L204	coil variable	1800-5100-521	
L205	coil variable	1800-5129-101	
L206	coil variable	1800-5129-102	
L207	choke .47 uhy	1802-0478-008	
L208	choke 22 uhy	1802-0220-008	
L209	choke 15 uhy	1802-0150-004	
L210	choke RF	1800-5100-522	
L211	not used		
L212	coil variable	1800-5129-103	
L213	coil variable	1800-5129-102	
L214	coil variable	1800-5100-523	
L215	coil variable	1800-5129-104	
L216	coil variable	1800-5129-102	
L217	not used		
L218	10.7 IF shielded	1800-3248-001	
L219	10.7 IF shielded	2800-3248-001	
L220	coil quad det	1800-3218-800	
L221	choke 1000 uhy	1800-3409-201	
L222	ferrite bead	2502-0000-001	

LOCATION	DESCRIPTION	PART NO.	
L223	ferrite bead	2502-0000-001	
L224	ferrite bead	2502-0000-001	
L225	ferrite bead	2502-0000-001	
L226	ferrite bead	2502-0000-001	
L227	ferrite bead	2502-0000-001	
L228	ferrite bead	2502-0000-001	
L229	ferrite bead	2502-0000-001	
DIODES			
CR201A	varicap	4809-5420-600	(4ch only)
CR201B	varicap	4809-5420-600	(4ch only)
CR201C	varicap	4809-5420-600	(4ch only)
CR201D	varicap	4809-5420-600	
CR202A	diode sil IN4148	4805-1241-200	(4ch only)
CR202B	diode sil IN4148	4805-1241-200	(4ch only)
CR202C	diode sil IN4148	4805-1241-200	(4ch only)
CR202D	diode sil IN4148	4805-1241-200	(4ch only)
CR203	diode sil IN4148	4805-1241-200	
CR204	diode sil IN4148	4805-1241-200	
CR205	diode sil IN4148	4805-1241-200	
CR206	diode sil IN4148	4805-1241-200	
CR207	diode sil IN4148	4805-1241-200	
TRANSISTORS			
Q201	Trans 2N5130	4801-0000-095	
Q202	Trans Blue Top SPS1476	4801-0000-003	
Q203	FET U310	4811-3406-200	
Q204	SPS-952-2	4801-0000-016	
Q205	Trans Blue Top SPS1476	4801-0000-003	
Q206	Junct FET 2N5668	4811-0000-030	
Q207	Trans Blue Top SPS1476	4801-0000-003	
INTEGRATED CIRCUITS			
IC201	IF sub system	3130-6056-500	
IC202	TDA 2002 AV	3130-5407-602	
IC203	LM358N	3130-3167-909	
MISCELLANEOUS			
CF201	filter ceramic	2700-3209-500	
XF201	xtal filter 2P 10.7MHz	2705-3232-200	
XF202	xtal filter	2705-1306-600	
XF203	xtal filter 2P 10.7MHz	2705-3232-200	
Y202	xtal 10.245 MHz	2301-3151-601	

6-2 TRANSMITTER BOARD (Main Board 704-064)

RESISTORS (All Resistors are ±5%, ¼W, unless otherwise noted.)

LOCATION	DESCRIPTION	PART NO.	
R301A	22K	4704-0223-032	
R301B	22K	4704-0223-032	(4 ch only)
R301C	22K	4704-0223-032	(4 ch only)
R301D	22K	4704-0223-032	(4 ch only)
R302A	10K ohms	4704-0103-032	
R302B	10K ohms	4704-0103-032	(4 ch only)
R302C	10K ohms	4704-0103-032	(4 ch only)
R302D	10K ohms	4704-0103-032	(4 ch only)
R303	82K	4704-0823-032	
R304	47K ohms	4704-0473-032	
R305	22K	4704-0223-032	
R306	10K 1/4W 10%	4700-0103-042	
R307	820 ohms	4700-0821-042	(1 ch only)
R307	470 ohms	4700-0471-042	(4 ch only)
R308	1K	4704-0102-032	
R309	270K	4704-0274-032	
R310	4.7K ohms	4704-0472-032	
R311	5.6K	4704-0562-032	
R312	330 ohms 1/4W 10%	4700-0331-042	
R313	2.2K 1/4W 10%	4700-0222-042	
R314	4.7K ohms	4704-0472-032	
R315	1.2 meg	4704-0125-032	
R316	100 ohms	4704-0101-032	
R317	4.7K ohms	4704-0472-032	
R318	47 ohms	4704-0470-032	
R319	2.2K 1/4W 10%	4700-0222-042	
R320	150 ohms 1/4W 10%	4700-0151-042	
R321	33 ohms 1/4W 10%	4700-0330-042	
R322	470 ohms	4701-0471-042	(4ch only)
R323	15K	4704-0153-032	
R324	47K ohms	4704-0473-032	
R325	4.7K ohms	4704-0472-032	
R326	10K ohms	4704-0103-032	
R327	47K ohms	4704-0473-032	
R328	res var	4751-3407-101	
R329	150 ohms 1/4W 10%	4700-0151-042	
R330	3.9 ohms 1/2W 10%	4701-0399-044	
R331	2.7 ohms 1/4W 10%	4700-0279-042	
R332	2.2K	4704-0222-032	
R333	100 ohms 1/2W 10%	4700-0101-044	
R334	100K ohms 1/2W 10%	4700-0101-044	
R335	100 ohms 1/4W 10%	4700-0101-042	
R336	1K 1/4W 10%	4700-0102-042	
R337	330 ohms 1/4W 10%	4700-0331-042	
R338	1K	4704-0102-032	(4 ch only)
R339	10K ohms	4704-0103-032	(4 ch only)

CAPACITORS

LOCATION	DESCRIPTION	PART NO.	
C301A	360PF 5% 50V(MICA)	1506-0361-550	(4ch only)
C301B	360PF 5% 50V(MICA)	1506-0361-550	(4ch only)
C301C	360PF 5% 50V(MICA)	1506-0361-550	(4ch only)
C301D	360PF 5% 50V(MICA)	1506-0361-550	(4ch only)
C302A	.01MF 50V +8-2(DISC)	1503-0103-007	(4ch only)
C302B	.05MF 50V +8-2(DISC)	1501-0503-003	(4ch only)
C302C	.01MF 50V +8-2(DISC)	1503-0103-007	(4ch only)
C302D	.01MF 50V +8-2(DISC)	1503-0103-007	(4ch only)
C303	2.2MF TANT 10V 20	1515-0229-002	
C304	120PF 5% 50V(MICA)	1506-0121-550	(1ch only)
C304	220PF 5% 50V(MICA)	1506-0221-550	(4ch only)
C305	.01MF 50V +8-2(DISC)	1503-0103-007	
C306	100PF 10% 50V(DISC)	1525-0101-004	
C307	.01MF +8-2 50V(DISC)	1503-0103-007	
C308	100PF 10% 50V(DISC)	1525-0101-004	
C309	100PF 10% 50V NPO (TM)	1539-0101-601	
C310	4.7PF 10% 500V NPO (DISC)	1500-0479-905	
C311	47PF 5% 50V NPO (RD)	1524-0470-002	
C312	180PF 10% 50V NPO (TM)	1539-0181-601	
C313	.01 tub cer 30% 25V	1538-0103-804	
C314	.005MF +8-2 50V(DISC)	1503-0502-005	
C315	100PF 5% 50V LCQ-17(MICA)	1506-0101-550	
C316	47PF 5% 50V NPO (RD)	1524-0470-002	
C317	100PF 5% 50V LCQ-17(MICA)	1506-0101-550	
C318	10PF 10% 500V NPO(DISC)	1500-0100-905	
C319	not used		
C320	.0022MF 10% 100V(MY)	1508-0222-610	
C321	820PF 5% 50V LCQ-17(MICA)	1506-0821-550	
C322	.01MF +8-2 50V(DISC)	1503-0103-007	
C323	not used		
C324	100MF 20V 85D (ELEC)	1513-0101-001	
C325	47MF 16V 85D (ELEC)	1513-0470-002	
C326	.1MF +8-2 50V(DISC)	1503-0104-010	
C327	47MF 16V 85D (ELEC)	1513-0470-002	
C328	tub cer .01 30% 25V	1538-0103-804	
C329	.01MF 10% 100V(MY)	1508-0103-610	
C330	tub cer .01 30% 25V	1538-0103-804	
C331	820PF 5% 50V LCQ-17(MICA)	1506-0821-550	
C332	.047MF 10% 100V(MY)	1508-0473-610	
C333	22PF 10% 50V NPO(DISC)	1500-0220-650	
C334	2.2PF 10% 500V NPO(DISC)	1500-0229-905	
C335	5.6PF 10% 500V NPO(DISC)	1500-0569-905	
C336	18PF 5% 50V NPO(DISC)	1500-0180-550	
C337	.47PF 10% (MUD)	1510-0478-900	
C338	10PF 10% 500V NPO(DISC)	1500-0100-905	
C339	68PF 10% 500V NPO(DISC)	1524-0680-002	
C340	470PF 20% 50V(DISC)	1523-0471-002	
C341	360PF 5% 50V LCQ-17(MICA)	1506-0361-550	
C342	not used		

LOCATION	DESCRIPTION	PART NO.	
C343	1.5PF 50V NPO(DISC)	1500-0159-250	
C344	36PF 10% 500V NPO(DISC)	1500-0360-550	
C345	4.7PF 10% 500V NPO(DISC)	1500-0479-905	
C346	.68 PF 10% (MUD)	1510-0688-900	
C347	10PF 10% 500V NPO(DISC)	1500-0100-905	
C348	2-6PF Trimmer	1517-0000-035	
C349	470PF 20% 50V Z5F (DISC)	1523-0471-002	
C350	tub cer .01 30% 25V	1538-0103-804	
C351	100PF 5% 50V LCQ-17(MICA)	1506-0101-550	
C352	.01MF +8-2 50V(DISC)	1503-0103-007	
C353	.001MF 20% 50V Z5F(DISC)	1523-0102-002	
C354	tub cer 4700PF 30% 25V	1538-0472-804	
C355	tub cer .01 30% 25V	1538-0103-804	
C356	tub cer .01 30% 25V	1538-0103-804	

COILS

L301A	coil rf variable	1800-3247-201	
L301B	coil rf variable	1800-3247-201	(4ch only)
L301C	coil rf variable	1800-3247-201	(4ch only)
L301D	coil rf variable	1800-3247-201	(4ch only)
L302A	choke 100 uhy	1802-0101-008	(4ch only)
L302B	choke 100 uhy	1802-0101-008	(4ch only)
L302C	choke 100 uhy	1802-0101-008	(4ch only)
L302D	choke 100 uhy	1802-0101-008	(4ch only)
L303	choke 100 uhy	1802-0101-008	(4ch only)
L304	coil rf var pink	1800-3191-404	
L305	coil rf var green	1800-3191-405	
L306	coil rf var pink	1800-3191-404	
L307	coil rf var green	1800-3191-405	
L308	ferrite bead	2502-0000-001	
L309	ferrite bead	2502-0000-001	
L310	coil	1800-3152-029	
L311	coil	1800-3152-019	
L312	coil	1800-3152-019	
L313	ferrite bead	2502-0000-001	
L314	ferrite bead	2502-0000-001	
L315	choke LM-2	1803-5125-902	
L316	coil	1800-3152-009	
L317	coil	1800-3152-030	
L318	choke molded 1½ turns	1803-5125-907	
L319	choke bead	2502-3254-101	
L320	choke rf .1 uhy	1802-0108-008	
L321	22 uhy	1802-0220-008	
L322	choke LM-2	1803-5125-902	
L323	ferrite bead	2502-0000-001	
L324	ferrite bead	2502-0000-001	

LOCATION	DESCRIPTION	PART NO.	
TRANSISTORS			
Q301	Trans Blue Top SPS1476	4801-0000-003	
Q302	Trans Blue Top SPS1476	4801-0000-003	
Q303	Trans Rf Pwr 696-7	4804-3169-607	
Q304	Trans Rf Pwr 696-7	4804-3169-607	
Q305	Trans Rf Pwr	4804-3402-301	
Q306	Trans Darlington	4814-0000-002	
Q307	Trans SPS 952-2	4801-0000-016	
Q308	Trans SPS 952-2	4801-0000-016	
DIODES			
CR301A	varicap	4809-5420-600	
CR301B	varicap	4809-5420-600	(4ch only)
CR301C	varicap	4809-5420-600	(4ch only)
CR301D	varicap	4809-5420-600	(4ch only)
CR302A	diode Sil IN4148	4805-1241-200	(4ch only)
CR302B	diode Sil IN4148	4805-1241-200	(4ch only)
CR302C	diode Sil IN4148	4805-1241-200	(4ch only)
CR302D	diode Sil IN4148	4805-1241-200	(4ch only)
CR303	diode Sil IN5401	4806-0000-013	
INTEGRATED CIRCUITS			
IC301	LM358N	3130-3167-909	
IC302	Reg 8.0V LM341	3130-0000-023	
MISCELLANEOUS			
RT301	thermistor Fenwal	5300-0000-001	
RY301	relay 12V	4500-3251-900	

6-3 VARIABLE PARTS FOR RANGE B (470-512 MHz)

LOCATION	DESCRIPTION	PART NUMBER
C204	20PF 10% 50V NPO(DISC)	1500-0200-650
C207	27PF 10% 500V	1501-0270-001
L205	coil variable	1800-5129-105
L206	coil variable	1800-5129-106
L212	coil variable	1800-5129-107
L213	coil variable	1800-5129-106
L215	coil variable	1800-5129-108
L216	coil variable	1800-5129-109
C339	47pf RD 50V	1524-0470-002
C345	3.9 PF 10% 50V NPO(DISC)	1500-0399-905
C346	.56PF 10%(MUD)	1510-0568-900
C347	8.2PF 10% 500V NPO(DISC)	1500-0829-905
Q201	Trans 2N5130	4801-0000-095
Q205	Trans Red Top SPS 1473	4801-0000-035
Q207	Trans Red Top SPS 1473	4801-0000-035
R247	100 ohm ½W 10%	4700-0101-044
R320	330 ohm ¼W	4700-0331-042
L322	3½T Red Coil	1803-5125-906

6-4 ON/OFF INDICATOR BOARD PARTS LIST (501-176)

LOCATION	DESCRIPTION	PART NUMBER
R401	470 ohm	4704-0471-032
R402	470 ohm	4704-0471-032
CR401	LED Red	4810-1282-900
CR402	LED Red	4810-1282-900

6-5 CHASSIS ASSEMBLY PARTS LIST

ELECTRICAL COMPONENTS

C-1	.001 CD +8-2 50V	1503-0102-003
C-2	.01 mylar 100V	1508-0103-610
R-1	5K Volume Control	4750-1230-305
R-2	7.5K Squelch Control	4750-1230-306
SW-1	Part of R-1	
SW-2	Channel Switch	5111-5426-300
SPK-1	Speaker	1301-3414-200
FS-1	fuseholder	2100-0000-003
	fuse 2 amp 3AG 250V	5106-0000-004
J-1	microphone conn	2105-0000-023
J-2	power conn	
J-3	Aux conn	2109-5120-408

MECHANICAL COMPONENTS

	bracket, heatsink	1400-1421-700
	bracket, PCB	1400-3413-100
	chassis	1403-7407-100
	panel, front (U01A)	1405-6413-002
	panel, front (U04A)	1405-6413-003
	panel, front (U01B)	1405-6413-005
	panel, front (U04B)	1405-6413-006
	handle, panel	1407-3413-601
	cover, bottom	1414-5425-300
	connector, antenna	2105-0000-020
	bonding strap	2110-3414-500
	knob	2402-3414-100
	label, 12 VDC	2507-1419-800
	label, transmit	2507-1419-900
	label, control	2507-1420-000
	label, receive	2507-1420-100
	shield, bottom	2508-5425-400
	mask, grille	2514-3414-300
	screw 4-40 x 3/16 bind	2803-0187-001
	screw 4-40 x 5/8 bind	2803-0625-001
	screw 6-32 x 5/16 phil	2804-0312-010
	screw 4 x 1/4 ABH	2811-3185-600
	screw 10-32 x 5/8 bind	2822-0685-001
	screw 5-32 x 5/16 tap	2824-0312-028
	crystal clip (U01)	2830-1420-701
	crystal clip (U04)	2830-1420-702
	washer No. 10 splitlock	2843-0000-008
	heatsink	5400-3407-201
	wire tie	6005-0000-002